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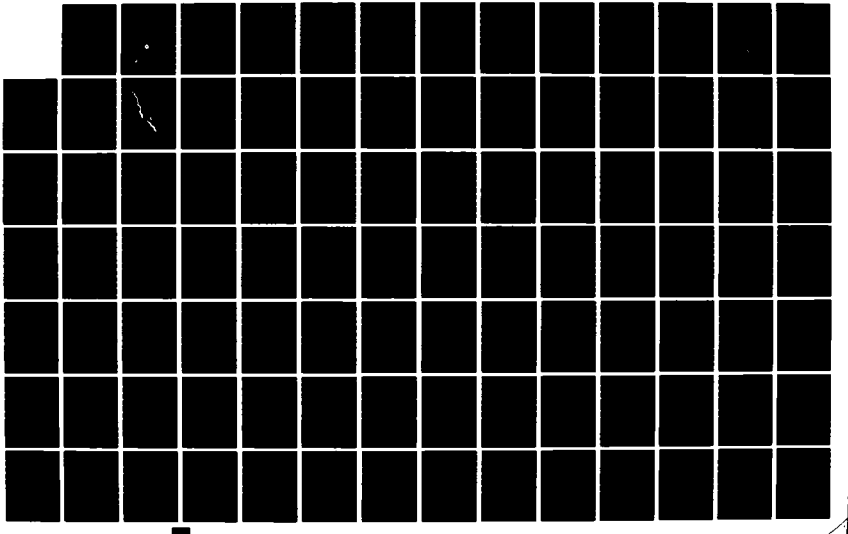

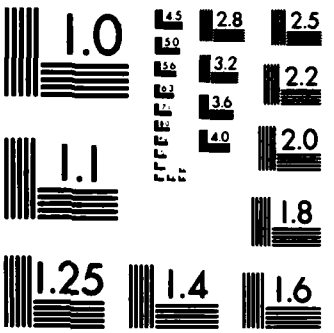

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ARCHAEOLOGICAL AND GEOMORPHOLOGICAL DATA RECOVERY AT SAYLORVILLE LAKE POLK COUNTY, IOWA

VOLUME I
TECHNICAL REPORT

Prepared Under the
Supervision of
Patricia M. Emerson
Principal Investigator

With the Assistance of
Harlan R. Finney

IMPACT SERVICES INCORPORATED
P.O. Box 3224 • Mankato, Minnesota

DECEMBER 1984

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Recovered data for ten sites which had been tested under a previous contract was analyzed and six of these sites were chosen for mitigative action. One of the sites was determined to consist of two separate areas, bringing the number of sites to seven Cultural data recovered included over 5,000 l'hic and ceramic artifacts, and a quantity of organic materials. The report decribes sites and recovered artifacts and addresses several broader topics including research questions and applications of RP3 study units.

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ABSTRACT

This report presents the results of archaeological and geomorphological investigations at seven prehistoric sites on the shores of Saylorville Lake, a U.S. Army Corps of Engineers flood-control reservoir located on the Des Moines River in Polk County, Iowa. The work reported herein was done as a continuation of work performed by Impact Services, Inc. of Mankato, Minnesota under the terms of Corps of Engineers Contract No. DACW25-82-C-0068. That contract had initially called for the resurvey of 27 previously-recorded sites at Saylorville Lake, 10 of which were then selected for more intensive testing. (The results of this phase of the contract are reported in Emerson et.al., Resurvey and Intensive Testing of Archaeological Sites at Saylorville Lake, Polk and Dallas Counties, Iowa, 1983.)

After testing was completed and the recovered data were analyzed, 6 of the 10 sites were chosen for mitigative action: 13PK259, 13PK264, 13PK274, 13PK276, 13PK314 and 13PK315. This work was necessary because of an impending increase in the level of the conservation pool at Saylorville Lake, which threatened to severely disrupt these sites. Mitigation in the form of efforts to protect the sites from the effects of flooding were deemed to be impractical in this situation, so emphasis was placed on the recovery of as much data as possible from each site before the pool-level increase went into effect in the fall of 1983.

During the course of data recovery, it was determined that one of the subject sites, 13PK314, actually consisted of two separate occupation areas. The Iowa Office of the State Archaeologist assigned a new designation (13PK23) to one of these areas, and the other area retained the designation 13PK314. Data recovery was thus conducted separately at each occupation area, bringing the total number of sites excavated to seven, instead of the six initially called for.

Archaeological data recovery was conducted primarily by means of block excavations at each site. Geomorphological investigations were simultaneously conducted, in order to define the geomorphic position of each site, and to identify intact and disturbed soil strata. The geomorphic investigations also focused on refinement of a preliminary model of landscape formation in the project area, which had been formulated during the initial survey and testing work done under this contract.

Data recovery efforts at the subject sites resulted in the recovery of over 5,000 lithic and ceramic artifacts and a quantity of organic materials, as well as the identification of several features and definition of various activity areas. This report presents detailed descriptions of the recovered artifacts and the sites themselves. It also addresses several broader theoretical and methodological topics, including research questions formulated in accordance with the MOA for the Saylorville Lake District, the application of RP3 study units to the project area, lithic and ceramic sequences for the Central Des Moines River Valley, and the taphonomic characteristics of sites in reservoir areas.

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FOREWORD

This report on data recovery at seven sites on the shore of Saylorville Lake is presented in three volumes. Volume I is the technical report of procedures and results, Volume II is public documentation (including artifact catalog, soils descriptions, Scope of Work, Technical Proposal and personnel vitae), and Volume III is confidential documentation (state site forms, time and personnel logs).

This report is the result of collaborative efforts among a number of individuals. Dr. Harlan R. Finney conducted the geomorphological investigations and prepared the relevant portions of the report. His field assistant was Terry Lemke. Archaeological fieldwork was done by Wanda A. Watson (who acted as Field Supervisor), Chuck Broste, John Evanson, Kate Kachel, Jon Muellerleile, Thor Olmanson and David Radford. Wanda Watson compiled the artifact catalog and summary artifact charts, analyzed organic remains and performed a number of other essential tasks. Chuck Broste performed the lithic edgewear analysis. Thor Olmanson drew the site maps and the artifact sketches in the catalog, with technical assistance from Jill Stoffregen.

I. INTRODUCTION

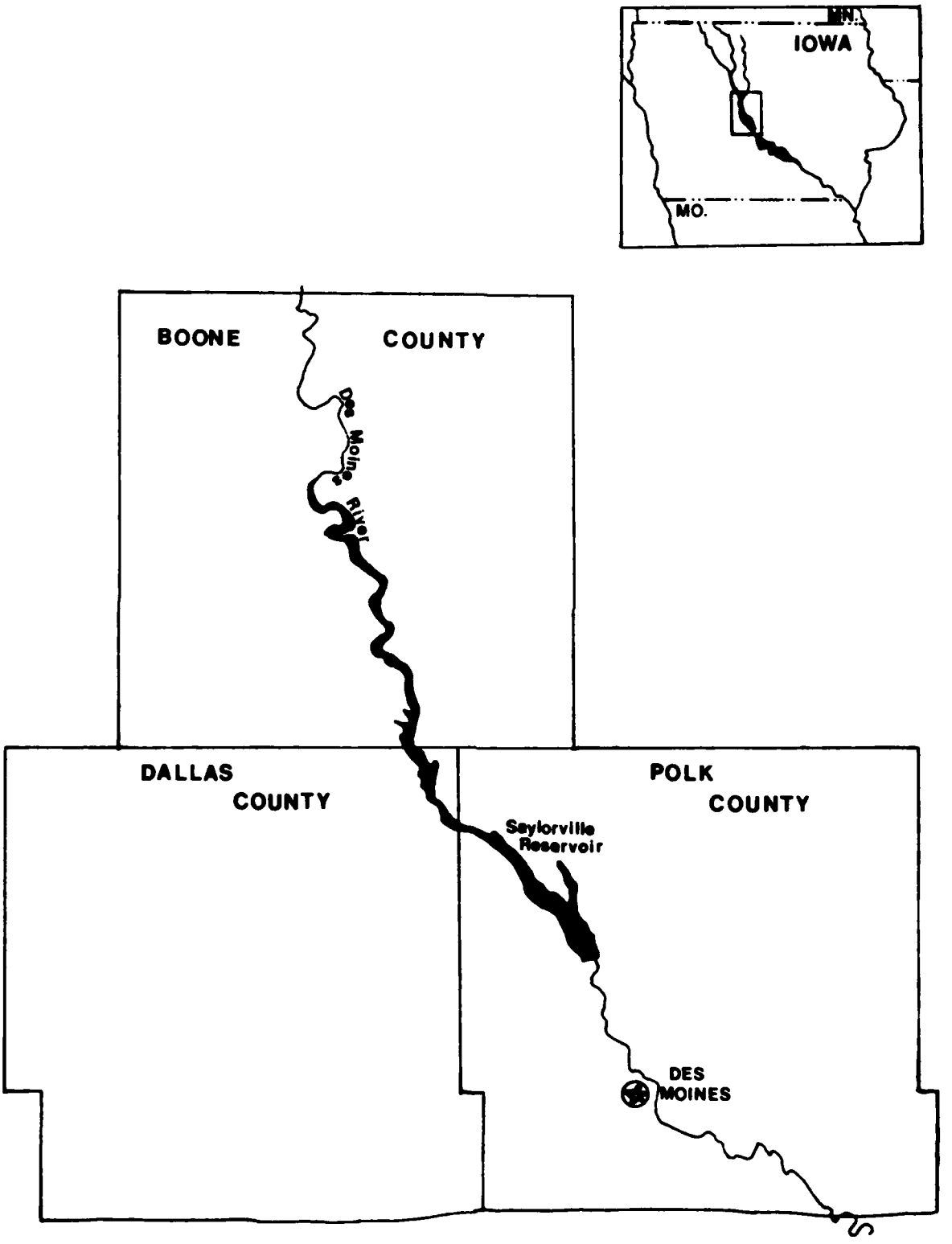
This report presents the results of a program of archaeological and geomorphological research at seven prehistoric sites on the shores of Saylorville Lake, a U.S. Army Corps of Engineers flood-control reservoir located on the Des Moines River in Polk County, Iowa (see Figure 1). The work was done in conjunction with a proposed increase in the level of the lake's conservation pool. (This increase actually went into effect in October of 1983.) The overall objective of the project was to recover as much information as possible from these sites before they were inundated by the pool-level increase.

The subject sites were initially recorded during a series of survey and shoreline-monitoring projects conducted at Saylorville Lake between 1974 and 1981. In 1982, plans for an increase in conservation-pool level from 833' NGVD to 836' in summer and 838' in winter led to the establishment of a contract between USAED-Rock Island and Impact Services, Inc. of Mankato, Minnesota, which focused on the evaluation of sites that would be affected by the pool level increase. The contract initially called for resurvey of 27 sites that had been recorded during the earlier survey projects. Each site was to be relocated in the field and evaluated in terms of present condition and research potential. On the basis of the information gathered during resurvey, the list was narrowed down to 10 sites which seemed to have some potential for yielding useful archaeological data. These sites were more intensively tested during the fall and winter of 1982, and an interim report of findings was submitted to the Corps of Engineers. That report included the recommendation that six of the ten sites should be considered for mitigative actions before the proposed pool-level increase went into effect. (See Emerson et.al. 1983 and Emerson 1983.)

The recommendation for mitigation was accepted by the Corps of Engineers, and several alternative mitigation plans were considered. Because of the inevitability of the pool-level increase and the probability that efforts to protect the sites from disruption by waves and inundation would not be successful, the existing contract was modified to include intensive data recovery as the most appropriate mitigative action. A plan for data recovery at the six sites was formulated by the Corp's District Archaeologist, in consultation with the State Historic Preservation Office and the Contractor. This plan called for preliminary assessment of each site after spring floods receded, followed by excavation of block areas that would provide a broad horizontal and vertical picture of the remaining cultural deposits. The plan also called for continuation of the geomorphic studies that had begun during the resurvey and testing phase of the contract, in order to refine the preliminary geomorphic model presented in Emerson et.al. 1983.

During the course of fieldwork, it was established that one of the sites, 13PK314, actually included two separate and unrelated occupation areas. The Iowa Office of the State Archaeologist therefore assigned a new designation, 13PK23, to one of these occupation areas, and the other area retained the designation 13PK314. This brought the total number of discrete sites under investigation to seven.

Figure 1. General Location of Saylorville Lake



The fieldwork for this project was conducted between August 10 and October 10, 1983. Patricia M. Emerson was the Principal Investigator for the project, and was responsible for over-all coordination of all phases of work. Dr. Harlan R. Finney was the project geomorphologist, and was responsible for conducting all necessary geomorphic investigations. In the following pages, the specific objectives of the project will be explained, a detailed description of the natural and cultural features of the project area will be presented, and the procedures and results of the data recovery process will be explained.

PROJECT OBJECTIVES

The work performed under this contract was done in accordance with legislative requirements including the National Historic Preservation Act of 1966 (as amended), Executive Order 11593, the Archaeological and Historic Preservation Act of 1974, and appropriate portions of Title 36 of the Code of Federal Regulations. In 1975, the Saylorville Archaeological District, defined as bounded by the project fee property taking, was determined eligible for inclusion on the National Register of Historic Places (NRHP). A Memorandum of Agreement (MOA) for the District was ratified in 1976 and modified by addendum in 1978 (see Appendix IV, Volume II). The work reported here is responsive to Items 2 and 4 of the modified MOA.

When the contract was first awarded in 1982, its primary concern was with certain sites that appeared to be in danger of disturbance or destruction as a result of a planned increase in conservation pool level. The data gathered during the resurvey and testing phases of work indicated, first, that adverse effects to sites in the reservoir area were certain once the pool-level increase went into effect, and second, that some of the sites investigated retained sufficient integrity to have potential for yielding significant archaeological information.

The proposed pool-level increase at Saylorville Lake which led to the initiation of this project is an action that would, by its very nature, result in adverse impact to cultural resources along the lakeshore. The MOA for the Saylorville Archaeological District specifies that archaeological resources that will be subject to adverse effect are to be investigated in order to "recover site data necessary for the interpretation of prehistory" in the project area (MOA:3). Because of the lack of intensive investigation of sites in the Saylorville Project Area, "data necessary for the interpretation of prehistory" encompasses a broad range of classes of information. The selection of sites for data recovery was therefore based on the assumption that, under the terms of the MOA, every site potentially qualified for data recovery unless destroyed or severely disrupted. As fieldwork progressed from resurvey to intensive testing, sites were eliminated from consideration for data recovery as deemed appropriate on the basis of this criterion. The seven sites discussed in this report are those which remained after the elimination process was completed.

This is, admittedly, a conservative approach to cultural resource management. However, when the choice is between adverse effect and mitigation, every consideration should be given to the second option. When the threat of destruction is clear, it is more prudent, and more in keeping with the aims of Federal cultural resource legislation, to begin with an assumption of significance until this assumption can be demonstrated to be

invalid for any particular site. As discussed in "Planning in Context", (the draft guidelines for NRHP studies compiled by the Advisory Council), any property should be classified as deserving of study unless sufficient data are available to indicate otherwise.

The plan for data recovery generated as a result of the resurvey and testing completed in 1982 delineates several major goals:

a) recovery of archaeological data at specified sites, primarily by means of block excavations;

b) continuation of geomorphological studies in order to further delineate landscape formation and alteration processes and to identify sources and extent of disturbance to cultural resources in the project area;

c) analysis of the recovered archaeological and geomorphological data in the light of six research questions formulated by the State Historic Preservation Office;

d) interpretation of the recovered data in terms of the study units and objectives of the draft document entitled Implementation of the Resource Protection Planning Process in Iowa (RP3) (Henning 1982).

In order to properly address the first objective, the data recovery plan specified certain procedures to be applied in the field. Work was to be conducted in two phases: a "quick assessment" phase, during which the extent to which each site had deteriorated during spring flooding was to be evaluated, and a data recovery phase, during which emphasis would be placed on excavation of block areas at each site. It was expected that some loss of cultural deposits would take place during spring flooding; therefore, it was deemed important to allow some flexibility in the specifications of the data recovery plan. The level of effort to be applied at each site was expressed as a minimum to probable maximum range of area (in square meters) to be excavated, with placement and size of individual excavation units left to the discretion of the Principal Investigator, on the basis of information gathered during the quick assessment phase.

The geomorphological studies called for by the data recovery plan were to focus on the establishment of a chronological model of landscape development in the portion of the Des Moines River Valley upstream from Saylorville Dam. This model was to be integrated with the model of Holocene landscape development generated by Benn and Bettis (1981) during their work in the Downstream Corridor at Saylorville Lake. Several related topics were also to be addressed, including temporal and/or geomorphic relationships among the subject sites.

Although over 400 prehistoric sites are currently known to exist in the Saylorville Project Area, most previous cultural resource studies have focused on description, and have not included much analysis or interpretation of recovered data. The present project therefore included an explicit requirement that the information gathered in the field was to be analyzed in light of a set of research questions which had been formulated in connection with the MOA mentioned above. These questions were intended to provide a framework within which site-specific and regional investigations could be performed. The desired analysis emphasized comparative studies, in order to clarify cultural sequences in the Des Moines River Valley and relationships with cultural manifestations in other parts of the Eastern Woodlands and the Plains. In addition, the results of the analytical process were to be related to the model of cultural sequences and research objectives presented in the

RP3 plan. The specific field and analytical procedures applied in an effort to meet these objectives are explained in Section II of this report.

DESCRIPTION OF PROJECT AREA

Operation of Saylorville Lake

Saylorville Lake came into existence in 1977 when waters in the Des Moines River Valley were impounded behind Saylorville Dam, which is located approximately 7 miles upstream from the city of Des Moines, Iowa. The lake thus created extends upstream for a distance of 17 miles to a point near the city of Madrid. In its lower reaches, the floodplain of the Des Moines River is relatively broad, and the lake in this area is somewhat more than a mile wide. As one moves northwest up the river channel, the floodplain narrows, so that at its furthest point upstream, Saylorville Lake is little more than 1,000 feet from bank to bank (see Figure 2).

Until the fall of 1983, the normal operating level of Saylorville Lake was 833′ NGVD (National Geodetic Vertical Datum), which was approximately 23′ above the mean height of the river prior to inundation by lakewaters. Excessive inflow from the Des Moines River drainage is contained in a flood-control pool which reaches to an elevation of 890′. During 1982, the Corps of Engineers negotiated an agreement with the Iowa Water Resources Council which called for an increase in normal operating level to 835′ in the summer and 838′ in the fall. This increase went into effect in the fall of 1983.

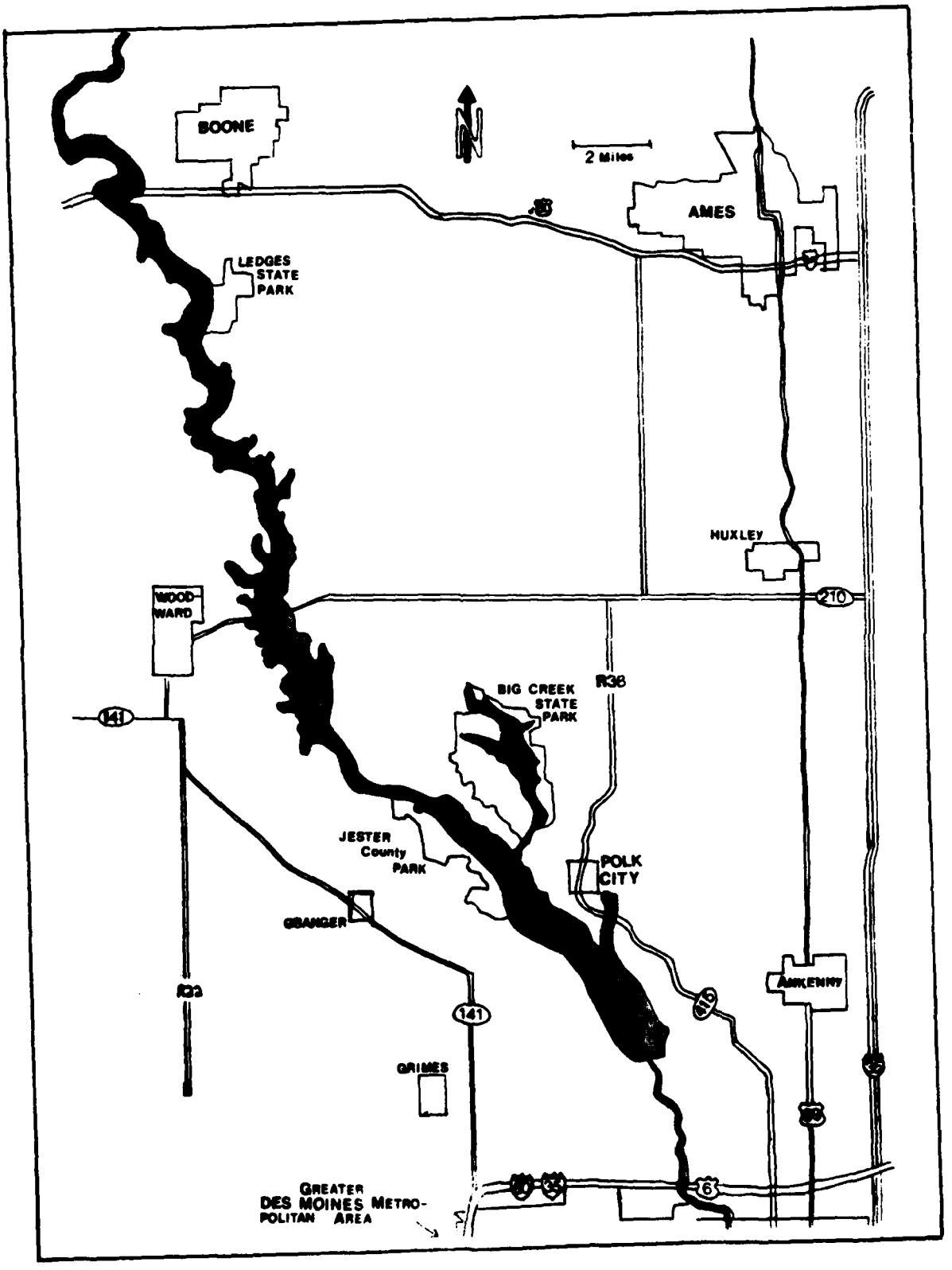
Because of the size of the basin drained by the Des Moines River (much of northwestern Iowa and a portion of southwestern Minnesota), inflow to the lake since its creation has caused extremely high water levels every spring since 1977. Because Saylorville is an artificial lake, its shoreline lacks stability, and continual fluctuation of water levels has accelerated the rate at which the shoreline is eroding. No exact measurement of lateral erosion has yet been done by the Corps of Engineers since such measurements are generally done only every 10 years, but examination of aerial photographs and topographic maps shows that the "widening" of the lake basin, which has occurred in some areas due to slumpage of cutbanks, can be measured in meters, rather than centimeters, of land lost.

The existence of Saylorville Lake has had other effects on the configuration of the river valley. In some areas, the sediments eroded away from the terraces and alluvial fans on the water's edge have accumulated around high spots in the floodplain to create new landforms (see the description of 13PK264). Sheet erosion has occurred differentially in some areas, leaving "micro-terrace" remnants of previous landforms. Accelerated entrenchment of stream channels is also evident, resulting in truncation of adjacent alluvial fans. All of these phenomena have had adverse effects on the cultural resources of the river valley, as will be discussed in the site descriptions which follow.

Geomorphic and Environmental Characteristics

In the Saylorville Lake area, the Des Moines River flows through the Bemis moraine, a terminal moraine deposited by the Cary advance of the Wisconsin glaciation. It is estimated that the retreat of the Cary occurred some 14,000 years ago, at which time a thick layer of glacial till was laid down over the previously-deposited Kansan tills (Ruhe 1969:61). The topography of the area is typical of relatively young landscapes, with

Figure 2. Saylorville Lake



moderate relief and many rolling hills. The average variation in elevation from river valley to uplands is not more than 100 feet.

In geomorphic terms, this area lies within the Western Lake Section of the Central Lowlands Physiographic Province of the United States, and more specifically, within the Des Moines Lobe Landform Region of Iowa (Prior 1976). (Considerable alteration of landforms by post-glacial factors is apparent in the river valley, however.) Major vegetational trends in the river valley can be roughly outlined on the basis of Benn and Bettis' work (1981) in the Downstream Corridor. (Since the division of the valley into Upstream and Downstream Corridors is a strictly artificial one, it is assumed that general vegetational patterns apparent in one would extend into the other.) At the close of the Pleistocene, around 10,500 B.P., a hardwood forest and possibly some relic conifer stands covered the valley floor (Walker 1966, Benn & Bettis 1981). Around 8,000 B.P., a shift in valley vegetation from a closed deciduous forest to a parkland with prairie vegetation occurred. Benn & Bettis suggest that prairie vegetation was dominant by 5,000 B.P. At approximately 4,000 B.P., a resurgence in the growth of trees occurred due to increased precipitation, and oak forests became established on the steep, east-facing valley walls (Benn & Bettis 1981:17). The prairie, although reduced in size, still survived in many areas of the valley.

The large meanders the Des Moines River occupied from 1,000 B.P. into the historic period became the new floodplain for the valley, and a floodplain forest developed in this region (Ibid.). Thus, by the early 1800s, vegetation patterns similar to present conditions were established in the valley. At the time of settlement by Europeans, the vegetation of the valley consisted of prairie grasses and deciduous hardwoods. The upland areas were covered primarily by grasses, with forest cover appearing in the stream valleys and floodplains. This pattern is reflected in the distribution of soil types in the valley, with forest-derived soils appearing on the alluvial fans and high terraces close to the lakeshore, and large stretches of prairie-derived soils found on the broad uplands.

Intensive agricultural activities during the past 150 years have drastically altered this vegetational pattern. Most of the upland prairie has been converted to farmland, increasing the rate of topsoil erosion from the uplands and the corresponding deposition of alluvium in the lower elevations. Many portions of the floodplain, especially in the broad reaches just upstream from the dam, were also cleared and used as agricultural lands. The forested, steep-sloped stream valleys which intersect the floodplain were less suitable for development and thus were for the most part left unaltered. Many of the alluvial fans that form the present shoreline were used for woodlots and so remained forested until Saylorville Lake was created, at which time most of them were cleared of timber to reduce the amount of deadwood in the lake. This loss of vegetational anchoring contributed to the acceleration of sheet erosion and cutbank slumpage along the shoreline.

The preliminary model of landforms generated during the first phase of this project delineates several major types of physical environments which exist in the project area. That model will not be discussed in detail here (refer to Emerson et.al. 1983), but a brief discussion of some of its characteristics is necessary to an explanation of the nature of the cultural resources under investigation. The portions of the model most directly relevant to the present study are the landforms identified as alluvial fans

and terraces.

The present shoreline of Saylorville Lake cuts across a system of alluvial fans which previously marked the location of upland drainages emptying into the floodplain. These fans generally follow a pattern of increasing elevation with distance up the river valley away from the dam. Close to the dam, most of the fans have been inundated by lake waters, but they gradually emerge from the lake as one moves upstream, finally reaching heights of some tens of feet above the lake level. (The location of 13PK276 is an example of such a high-lying fan.)

Three terraces can be identified in the project area above the floodplain. One of these actually lies in the uplands above the river valley, just west of Mosquito Creek, about 10 miles upstream from Saylorville Dam. Another terrace appears discontinuously along almost the entire length of the lake, at elevations ranging from 860' to 900'. The third terrace appears above the lake level in only a few places (including the location of 13PK259). These two lower-lying terraces exhibit soils which formed under savannah and prairie, while the highest terrace shows evidence of both prairie and forest vegetation in the past.

The model discussed in Emerson et.al. (1983) attempted to place these landforms into the chronological sequence developed by Benn and Bettis (1981) and Benn and Harris (1982). This sequence identified several systems of terraces that had developed as a result of migration of the Des Moines River meander belt during the Holocene. It also associated the alluvial fans in the Downstream Corridor with the episode of fan development identified in western Iowa as having taken place between roughly 8,500 and 2,500 B.P. The work conducted in 1982 in Saylorville Lake proper placed the alluvial fans along the lakeshore into the early stage of this period of fan development (5,000 to 8,000 B.P.). On the basis of further research, this placement still seems sound, for several reasons. First, the well-developed soils found on the fans and their surface forms indicate considerable age. Also, active alluvial fans have profiles along their radii that are concave upwards like the longitudinal profile of a stream (Ruhe 1975). None of the fans studied during this project have such a profile. Instead, their distal parts have a distinct increase in slope, compared to their upper parts. The part with the steeper slope, or truncated part, undoubtedly was caused by a meandering and perhaps incising Des Moines River. Further, the streams which once fed the fans are now incised far below their surfaces, and have deposited no sediments on the fans for some time.

Since none of the sites studied during this project are located on the two higher-lying terrace formations mentioned above, no estimates of age were compiled for these landforms. On the basis of investigations conducted in 1982, it was suggested in Emerson et.al. (1983) that the third terrace, the landform upon which 13PK259 is located, is analogous to either the "high" or "intermediate" terrace of the Des Moines River (using Benn & Harris' terminology). Further study of that locality, coupled with the results of laboratory analysis of soils, indicates that placement with the "high" terrace is the more appropriate designation. This indicates an age for this landform in the range of 4,000 to 5,000 B.P. An adjacent terrace formation (the location of 13PK264), although it is only about 1 m lower in elevation than the highest point of the 13PK259 terrace, is perceived to belong to the "low" terrace formation due to the weakness of soil development. A very recent date

of formation, perhaps post-settlement and certainly no earlier than late prehistoric, can be postulated for this landform. A buried horizon encountered at about 90 cm below the surface of this terrace can be identified as part of Benn and Harris' "intermediate" terrace system, which formed sometime after 4,000 B.P. (More detailed information about the landforms and soils of the subject sites can be found in the site descriptions which follow.)

Cultural Overview

In order to provide a standard frame of reference for the culture history of the Saylorville Lake Project Area, that history will be discussed in terms of the study units outlined in the draft document entitled Implementation of the Resource Protection Planning Process in Iowa (RP3) (Henning 1982). The RP3 document is intended to provide a consistent framework within which research throughout Iowa can be designed, interpreted and evaluated. The central concept of the plan is the use of "study units": each unit represents a definable, distinct cultural manifestation, known or suspected to have existed in a particular part of Iowa at a certain time in the past. Research can thus be focused on examination of one or more particular study units or on questions such as the interrelationships between contemporaneous study units. This approach is intended to facilitate comparisons of work done by different researchers in different areas, and to provide a consistent basis for the analysis of research data.

The RP3 study units relevant to the present project are summarized in Figure 3. Each unit is defined along spatial, temporal and cultural dimensions, on the basis of current knowledge about prehistoric cultural manifestations and environmental characteristics in Iowa. The estimated proximity of each study unit to the Saylorville Lake Project Area is also indicated. In the following pages, each of these study units will be discussed in terms of whether or not it is known to be present at Saylorville Lake, the types of evidence available upon which that determination can be made, and the extent to which the study units correspond to the present body of knowledge about the prehistory of the Central Des Moines River Valley.

Because so much of the past work at Saylorville Lake has focused on site location rather than detailed excavation and analysis, our present understanding of the prehistory of this area is somewhat vague. As an illustration, Figure 4 presents a summary of cultural affiliations assigned to sites located during Iowa State University research in the project area. Note that 133 - over 35% - of these sites could not be defined as to temporal or cultural affiliation. Absolute dates in the form of 13 radiocarbon assays have been obtained for only six sites. For the remaining 228 sites, definitions of cultural affiliation were based solely on artifactual evidence.

Returning to Figure 3, note that the three earliest RP3 study units are defined as being present (or potentially present) over the entire state. Although this circumstance does relate to the nature of these cultural manifestations - i.e. the fact that, internally, each appears to have been a response to a more or less uniform physical environment over large areas of the Midwest - it is also in part a result of the generally poor understanding of these time periods throughout Iowa. The first of these units, the "Pre-Clovis", covers the time during which glacial ice was withdrawing from the Upper Midwest. The presence of humans in the New World at this very early

Figure 3. RP3 Study Units in the Saylorville Lake Project Area

Study Unit	Timeframe	Area	Characteristics
Pre-Clovis	before 12,000 BP	all of Iowa	kill sites of extinct megafauna; "chopper" tools.
Paleo-Indian	12,000-8,000 BP	all of Iowa	lanceolate point forms; kill sites of extinct & modern fauna.
Early-Middle Archaic	8,500-4,000 BP	all of Iowa	utilization of prairie environment to 5,000 BP; burials with grave goods; stemmed and side-notched points and scrapers; probably many regional variants.
Late Archaic			
Eastern	4,000-2,500 BP	Des Moines River Valley (includes project area)	more diversified resource base; differential resource utilization; possible growth of trade networks; ossuaries; Eastern subunit tentatively identified with Archaic in eastern woodlands; Prairie/Plains subunit tentative continuation of early Archaic patterns; Prairie Lakes subunit similar to traditions in southwestern Minnesota and eastern Dakotas.
Prairie/Plains	4,000-2,500 BP	western Iowa (adjacent to project area)	
Prairie Lakes	4,000-2,500 BP	north-central Iowa(adjacent to project area)	
North Central Woodland			
Early-Middle	2,500-1,500 BP	Des Moines Lobe (includes project area)	possible transient populations; burial mounds; lake-oriented settlement pattern; many regional variations in lithic & ceramic styles; possible link to cultures to the North.
Late	1,500-1,100 BP		
Villages	after 1,100 BP		
Plains Woodland			
Early Woodland	2,500-1,900 BP	Western Iowa (adjacent to project area)	distinctive regional ceramic styles; horticultural villages later in time; less cohesive regional patterns at end of time period.
Middle Woodland	1,900-1,700 BP		
Early Late Woodland	1,700-1,300 BP		
Late Late Woodland	1,300-800 BP		
Southern Iowa Woodland	1,200-700 BP	Southern Iowa (adjacent to project area)	similar to Missouri River Trench manifestations; localized burial customs; sub-units poorly understood.
Mississippi Basin Woodland			
Early Woodland	2,500-2,200 BP	tributaries in eastern Iowa (anticipated in project area)	related to Middle Mississippi Basin manifestations; diagnostic ceramic styles for subunits; temporal variations in mound architecture; focal hunting & gathering communities.
Middle Woodland	2,200-1,650 BP		
Early Late Woodland	1,650-1,350 BP		
Late Late Woodland	1,350-800 BP		
Great Oasis	1,200-900 BP	western & central Iowa (includes project area)	part of Middle Missouri tradition; large horticultural villages; some regional variations in settlement patterns.
Moingona/Burlington	850-750 BP (?)	Central Des Moines Valley (includes project area)	Oneota manifestation; phases distinguished on basis of ceramic styles.

Figure 4. Cultural Affiliations of Recorded Sites at Saylorville Lake

Cultural Affiliation	Number of Sites
Indeterminate Prehistoric	133 (36.2%)
Indeterminate Prehistoric/Historic	20 (5.5%)
Burials/Mounds	19 (5.2%)
Paleontological	1 (0.3%)
Paleo-Indian	1 (0.3%)
Paleo/Archaic/Woodland	2 (0.5%)
Paleo/Archaic/Woodland/Post-Woodland	1 (0.3%)
Paleo/Historic	1 (0.3%)
Archaic	2 (0.5%)
Archaic/Woodland	17 (4.6%)
Archaic/Woodland/Post-Woodland	2 (0.5%)
Archaic/Woodland/Post-Woodland/Historic*	6 (1.6%)
Archaic/Woodland/Historic	11 (3.0%)
Woodland	77 (21.0%)
Woodland/Post-Woodland**	10 (2.8%)
Woodland/Post-Woodland/Historic***	6 (1.6%)
Woodland/Historic	38 (10.4%)
Post-Woodland	3 (0.8%)
Historic	17 (4.6%)
TOTAL	367 (100%)

* three of the post-Woodland components have been identified as Great Oasis.
** five of the post-Woodland components have been identified as Great Oasis.
*** four of the post-Woodland components have been identified as Great Oasis.

Radiocarbon assays have been completed for the following sites:

13BN30:	2350 BP	13PK149:	1145 ± 65 BC	13PK149:	AD 345 ± 55
13BN103:	1610 ± 80 BC	"	1095 ± 65 BC	"	AD 475 ± 55
13BN121:	AD 350 ± 55	"	670 ± 65 BC	"	AD 1110 ± 50
13BN182:	1870 BP	"	AD 345 ± 60	13PK315:	2110 ± 330 BP
"	2540 BP				

(Compiled from Gradwohl & Osborn 1973, 1974, 1975a, 1975b, 1976; Osborn & Gradwohl 1981.)

date is a topic of considerable controversy in other parts of North America, and is defined in the RP3 draft on the basis of inferences drawn from outside Iowa, since no sites predating 12,000 BP have yet been discovered in the Upper Midwest. It is assumed that a "Pre-Clovis" study unit was included in the RP3 draft so as to allow for possible future identification of Late Pleistocene occupations in Iowa. In theory, there is some potential for such occupation in areas not covered by the most recent advances of the Wisconsin glaciation. The Saylorville Lake area, however, was glaciated virtually continuously until the end of the Pleistocene, and thus holds little promise of containing Pre-Clovis sites.

The next study unit, the Paleo-Indian, is only slightly better known in Iowa. Lanceolate and fluted projectile points characteristic of the Paleo period have been found in various parts of the state, but have come only from isolated surface finds or disturbed contexts, and therefore have not contributed much to our understanding of settlement and subsistence patterns. No Clovis or Folsom-style fluted points are known to have been found at Saylorville Lake. As indicated in Figure 4, researchers from Iowa State University have identified 5 sites at Saylorville Lake that appeared to have Paleo-Indian components. However, four of the five yielded artifacts only from surface or disturbed subsurface contexts, and none of the recovered artifacts (lanceolate and stemmed projectile points) can be undisputably defined as being Paleo-Indian in origin. They may, instead, represent a continuation of some Paleo-Indian lithic styles into the early part of the Archaic period.

The next study unit, the Early-Middle Archaic, corresponds to a time of prairie expansion eastward, which gradually ameliorated after about 5,000 BP. It also encompasses a period of alluvial fan development which may have been related to encroachment of prairie vegetation into previously-forested areas (Bettis & Thompson 1981:8). In many small stream valleys in western Iowa, a gap exists in the stratigraphic record for this time period, due to the destruction of landforms by the erosional processes which were on-going during the Altithermal climatic episode. Evidence of Early or Middle Archaic occupation in such localities may also have been adversely affected (op.cit.:11). In the Des Moines River Valley, surfaces identified in the Saylorville Downstream Corridor as the Beaver Creek Terraces (Benn & Harris 1982:24) would have been available for settlement during this time. Large portions of these terraces were destroyed by subsequent migration of the river channel, however, and any remnants which persisted in the Upstream Corridor now lie well below the lake level.

Up to this time, no Early or Middle Archaic sites have been intensively investigated at Saylorville Lake. Some surface artifacts of characteristic Archaic forms were recovered during the ISU surveys prior to impoundment. Reliance on lithic typologies for identification of Archaic occupations, however, is somewhat problematical. Given the probability that regional variants were developing during this time, coupled with the lack of radiocarbon-dated sites in the project area, it is not presently possible to identify sites of this era with any certainty. The persistence of lithic styles through time (a phenomenon discussed in succeeding pages) is another factor that would make identification of Archaic sites solely on the basis of artifact assemblages quite tentative. In any case, the recovered materials serve only to suggest some kind of Early to Middle Archaic presence in the river valley, but provide no clues as to the nature of that presence.

When one moves to consideration of the next RP3 study unit, it becomes possible to identify regional variations in cultural patterning with greater certainty. The RP3 divides the Late Archaic period into four tentative subunits, three of which may be relevant to the Saylorville Lake area: the Eastern subunit, which is defined as having existed in the Des Moines River Valley (including the Saylorville Lake area), the Prairie Lakes subunit, just to the north of the project area, and the Prairie/Plains subunit, to the west of the project area. This division reflects a perceived increase in the stability and diversity of environmental resources, and a corresponding increase in localized subsistence strategies.

Here again, previous research at Saylorville Lake has provided suggestions, but no answers about the Late Archaic occupation of the river valley. As Figure 4 indicates, at least 25 sites in the project area are perceived to contain Archaic components, all identified on the basis of lithic typology. Some of these have yielded stemmed or side-notched points similar to those associated with Late Archaic burials at the Lewis Central School Site, 13PW5 (Osborn & Gradwohl 1981:636). However, local specializations in lithic technology are not yet well enough understood to provide a basis for definition of regional divisions within the Late Archaic period.

Figure 4 shows that a relatively high percentage of sites at Saylorville Lake have been defined as having both Archaic and Woodland components. This may actually reflect multiple occupations in some cases, but may also relate in part to the probable overlap of lithic styles from the Late Archaic to the Early Woodland. Distinguishing a Late Archaic component from an Early Woodland component is especially problematical when dealing with small, aceramic sites or artifact assemblages collected only from surface contexts. Such situations constitute a majority of the recorded "Archaic/Woodland" sites at Saylorville Lake.

As Henning points out, the boundary between the end of the Archaic and the beginning of the Woodland is "very fuzzy" (Henning 1982:32), in part due to the time-transgressive nature of certain projectile point styles. (Some point types - Clovis, Folsom, LaCroy, Snyder's, Madison, etc. - are well-established as period markers. Others, however, cannot yet be firmly associated with particular timeframes. It is this category of artifact that is the subject of discussion here.) In the Des Moines River Valley, this overlap between Archaic and Woodland point styles may relate to the environmental characteristics of the region after the Altithermal. The eastward expansion of the prairie during the Middle Archaic included an extension of large prairie fauna as far as western Illinois. As prairie vegetation disappeared from this area after 4,000 BP, so did prairie fauna. Cultural adjustments to the altered physical environment to the east of the project area included modification of hunting techniques and, therefore, projectile point styles. In the vicinity of the Central Des Moines River Valley, however, the prairie persisted in the uplands. Continued intensive utilization of prairie resources during the Woodland period may account for the persistence of points resembling larger Plains types (or Archaic types, according to typologies developed in eastern Iowa and western Illinois). This pattern of exploitation of prairie resources by people who followed an essentially "Woodland" lifestyle has been documented at the Lake Bronson site in Minnesota (Anfinson et.al. 1978), and may be relevant to the Saylorville Project Area as well. In any case, until more radiocarbon dates are obtained, and taxonomic systems are refined to account for period overlap, definite

temporal classification of aceramic or disturbed Late Archaic/Early Woodland sites is likely to remain a chronic problem in Midwestern archaeology.

Moving into examination of the Woodland period RP3 study units, a marked increase in the number of identified regional variants, most defined on the basis of distinctive ceramic styles, is clear. Several different Woodland manifestations may be relevant to research in the Saylorville Project Area: it is included in the North Central Woodland study unit, is peripheral to the defined extent of the Plains Woodland and Southern Iowa Woodland study units, and is "anticipated" to be part of the Mississippi Basin Woodland study unit. It has already been well-established that, in the Midwest at least, this period was a time of continual cultural contact, with concomitant adaptation of technologies, ideologies and social patterns far beyond their areas of origin. Since the Des Moines River was probably a major route for traffic into and out of Central Iowa, a range of technological styles and settlement patterns would be expected to appear as a result of both importation of cultural traits from outside the valley and transitory utilization of the valley by groups from other regions. It is expected that these contacts would be reflected most clearly in ceramic manufacture and decoration techniques, since the nature of this medium allows for much more variation within functional limits than does lithic raw material.

The North Central Woodland study unit is not defined in great detail in the RP3 document, and it is therefore difficult to evaluate its relevance to the project area. It appears to have been defined mostly on the basis of data from the Prairie Lakes region of Iowa, in which settlement patterns were heavily lake-oriented. This pattern, obviously, is different from what one would expect to find in the Des Moines River Valley. However, the diverse ecology of the project area may have made it attractive for intermittent exploitation by peoples from the lakes region. This factor may account for the perceived "transient" nature of settlement in the area. Although not explicitly mentioned by Henning, it is assumed that the ceramic wares known as Fox Lake and Lake Benton (as defined in Anfinson 1979 and Tiffany 1982) would be considered characteristic of this study unit. At present, no examples of these ceramic styles have been identified at sites in the project area.

The relationship between Woodland occupations in the project area and the Southern Iowa Woodland study unit is, again, difficult to define with any clarity. This study unit is in itself poorly understood, although some connection to Woodland manifestations in the Missouri River trench is apparent. The analysis of materials recovered during the present project included a comparison of ceramic wares defined in Missouri and Arkansas with artifacts recovered from the sites tested, during which no strong similarities in ceramic manufacture or decorative techniques were noted.

An indication of some connection between the Central Des Moines River Valley and the Plains Woodland study unit can be inferred from the recovery at Saylorville Lake of a few ceramic artifacts similar to types found in southwestern Iowa and regions further west. One rim sherd from 13PK274 resembles Rowe Cord-Marked (as defined in Tiffany 1978), rims from 13PK314 (probably actually from 13PK23) are similar to Missouri Bluffs Cord-Impressed (Tiffany 1978) and also unnamed types described by Tiffany (1977) at the Sharp's Site in southwestern Iowa, and a large rim sherd from 13PK285 appears to be a variant of Valley Cord-Roughened, a Plains type defined by Kivett in 1949. As discussed later in this report, Plains influence in the project area

is apparent in certain aspects of ceramic technology - in particular, rim and shoulder form, although decorative motifs tend to more closely resemble those of wares found to the east. The strength of the connection is increased by the resemblance between many projectile points found at sites in Saylorville Lake to types described by Bell and Perino (1958, 1960, 1968, 1971) as occurring over wide areas of the Plains (see Emerson et.al. 1983:Volume II for descriptions of these artifacts). Additionally, one site - 13PK165 - has provided some slight evidence of horticulture, a characteristic of the Plains Woodland-Late Woodland subunit. This site yielded a few charred corn kernels and what may be a cucurbit seed, in association with single-cord-impressed, grit-tempered ceramics (Osborn & Gradwohl 1981:640).

In terms of the relationship of the project area to the next RP3 study unit, the Mississippi Basin Woodland, ceramic typology is again the most obvious evidence of influence. Henning lists a number of ceramic types characteristic of the various temporal subdivisions of this study unit (1982:42-43), most of which have already been identified at Saylorville Lake. A tentatively-identified Spring Hollow Incised or Black Sand Incised sherd was found at 13PK274 during the 1982 field season; a number of Havanoid forms have been recovered from sites including 13PK152, 13PK263, and 13PK274; a Madison Cord-Impressed or Fabric-Impressed rim was found at 13DA161 during resurvey, and sherds reminiscent of Madison and Weaver Ware varieties have been found at sites including 13PK194, 13PK272, and 13PK314. Lithic artifacts from the project area which can be identified as of Havana-Hopewell association include Snyder's variants from 13PK263, 13PK274 and 13PK314, and a Mounds Stemless point from 13PK259. Additionally, Madison and Fresno points have been found at 13PK195, 13PK198, 13PK259, 13PK264, 13PK313 and 13PK315.

On the basis of this evidence, Henning's designation of the Mississippi Basin Woodland study unit as "anticipated" in the Central Des Moines River Valley could be strengthened to a definite inclusion. Also, although analysis of site functions at Saylorville Lake has been neither intensive nor extensive, the subsistence pattern "focal communities of hunters and gatherers" (Henning 1982:43) does not contradict any information thus far recovered from sites in the project area which yielded ceramics similar to the Mississippi Basin Woodland types, and is supported in a negative sense by the lack of evidence for horticultural activities at such sites.

The final two study units relevant to the present project are both distinguished as large-scale cultural manifestations initially derived from regions outside the Central Des Moines Valley. The first of these, the Great Oasis study unit, again reflects a connection with Plains culture - the Middle Missouri tradition, in this case - and has been known to be present in the project area for some time. Several Great Oasis sites in the northern portion of Saylorville Lake have been excavated (see Gradwohl 1974, Osborn & Gradwohl 1981 for discussion), and radiocarbon dates from one site place the period of occupation between 975 A.D. and 1080 A.D.

The final study unit that includes the project area is a subdivision of the Oneota tradition which was first defined by Charles Keyes. On the basis of distinctive ceramic attributes, Gradwohl (1967) designated the Oneota presence in the Central Des Moines River Valley as the Moingona phase, which has been combined in the RP3 with the Burlington phase because of perceived similarities in ceramic assemblages. Moingona phase sites are best known to the south of Saylorville Lake, in the Red Rock Reservoir, although recent work

by Benn and Harris (1982) in the Saylorville Downstream Corridor has led to the definite identification of an Oneota presence in that locality.

No Oneota sites have yet been identified with any certainty within the boundaries of Saylorville Lake itself. Osborn & Gradwohl (1981:649) note that a few shell-tempered sherds have been found at each of 4 sites in Polk and Boone Counties, and four shell-tempered sherds were recovered from 13PK264 during the 1982 field season. Two of these sherds carry faint traces of trailed decoration, and the third appears to be a loop handle, an attribute characteristic of Moingona phase ceramics. The significance of such small samples of Oneota ceramics at Woodland or Great Oasis sites is difficult to assess. At 13PK264, the shell-tempered sherds were found in a surface concentration of bone and grit-tempered sherds, along the edge of a recent (probably post-settlement) accumulation of sediments at the edge of the Des Moines River floodplain. As such, they do not seem indicative of a primary deposition of Oneota materials in this location. They may, instead, represent intermittent contact - trade, perhaps - between contemporaneous occupants of the river valley, or, perhaps, intermittent Oneota exploitation of mammalian or aquatic resources in what was probably a prime hunting area during the fall and winter. This possibility is enhanced by Benn's identification of a seasonal Oneota hunting camp in the Downstream Corridor, in a similar geomorphic position to that in which 13PK264 lies.

In summary, it can be stated that there is sufficient artifactual evidence from the Saylorville Lake project area to include it in at least seven of the ten RP3 study units defined for the prehistoric period in and around Central Iowa. The cultural manifestations discussed here bear perhaps the greatest resemblance to major cultural traditions found in the Eastern Woodlands, but they do diverge from these patterns in certain respects. Some sites at Saylorville Lake have demonstrated affinities to cultures of the Great Plains, and others have proven to be undefinable in terms of our present understanding of lithic and ceramic taxonomies. Four of the study units represented at Saylorville Lake overlap in time, indicating at least some level of cultural contact and/or migration during and after the Woodland period. When the nature of earlier occupations in Iowa is better defined, it may be discovered that a similar situation obtained prior to the beginning of the Woodland. Given the position of Saylorville Lake in the ecotone between the eastern deciduous forest and the prairie, it is not surprising to see evidence of continuous contact among diverse cultural manifestations.

PREVIOUS INVESTIGATIONS

The history of archaeological research at Saylorville Lake is a long and complex story. Only a synopsis of that story is presented here; the reader is referred to the reports listed in the bibliography for more detailed information.

Prior to 1962, no systematic archaeological surveys had been done in Polk, Dallas and Boone Counties. The only recorded sites were those that had been reported by local landowners, or located by early researchers such as Charles Keyes. During the 1920s and 1930s, the Iowa Archaeological Survey, under Keyes' direction, investigated 21 sites in Polk, Dallas and Boone Counties, eleven of which were human interments or earthworks (Tiffany 1981). In 1964, Michael J. Ashworth and Marshall McKusick of the Office of the State

Archaeologist generated a small report which was essentially a review of existing knowledge about sites in the area.

When the Saylorville Project entered the planning stage in the mid-1960s, the Federal Government became the main impetus for archaeological fieldwork aimed at systematic site location, testing and excavation. In 1966, crews from the Smithsonian Institution's River Basin Survey program did limited testing at a few known sites in the area, and recorded several new site locations. The National Park Service, through its Heritage Recreation and Conservation Service, was instrumental in setting up a program for systematic survey of the lands to be affected by the creation of Saylorville lake and the ancillary Big Creek Sub-Impoundment area. In 1967, a contract for such survey was established with Iowa State University (ISU). The purpose of the work conducted under this contract, which was based in part upon the results of previous research in the area, was to "test and excavate certain archaeological sites selected on the basis of salvage criteria as well as historical and scientific significance" (Osborn & Gradwohl 1981:4).

It was during the initial construction phase of the Saylorville Project that much of the existing federal legislation relating to cultural resource management went into effect. Thus, it was not until after construction and land-use plans had been finalized that the Corps of Engineers acquired a regulatory responsibility for inventory and assessment of cultural resources in the Saylorville Project Area. The pace of cultural resource research in the area was then accelerated, in terms of both site-location survey and evaluation of known sites, some of which had already been disturbed by construction and earth-moving activities associated with dam construction.

An initial contract was established between the Iowa State Historic Preservation Program and Iowa State University in 1973 to conduct intensive surface reconnaissance on the left bank of the Des Moines River, immediately upstream from the proposed dam location (Osborn & Gradwohl 1981:4). In the next 7 years, a series of contracts were established between USAED-Rock Island and ISU, each of which called for survey of a specified portion of the project area. These contracts were executed by ISU under the direction of David M. Gradwohl and Nancy M. Osborn. The archaeological research that was conducted under these contracts was primarily reconnaissance-level, employing surface reconnaissance as the major method of site location. This procedure was supplemented by "shovel-assisted" survey techniques when deemed necessary (op. cit.:5).

As a group, this series of reconnaissance-level surveys resulted in the location of over 400 prehistoric and historic sites in the project area (Ibid.). While they were being conducted, other contracts were generated which called for intensive testing and emergency salvage operations at specific sites thought to be in imminent danger of destruction by construction activities. These projects were also conducted by personnel from Iowa State University.

In 1974, on the basis of the information gathered during these projects, the Saylorville Archaeological District was determined to be eligible for nomination to the National Register of Historic Places. This district was defined by the boundaries of the government's property fee taking. The Memorandum of Agreement negotiated between USAED-Rock Island and the Advisory Council on Historic Properties called for additional evaluation of sites in

the district, especially those located in the lower reaches of the lake's flood-control pool. The MOA specified that the results of this evaluation would be used to determine the nature of the district's prehistoric and historic properties, and would be the basis for any necessary modification of district boundaries.

After Saylorville Dam was completed and waters were impounded in the lake, a program of shoreline monitoring was instituted to evaluate the effect of further construction activities and inundation at known archaeological sites. This program resulted in the location of a number of additional sites not recorded during the initial reconnaissance-level surveys, especially along the once-forested shoreline areas that were cleared of timber before impoundment.

In 1982, the contract under which the present research was conducted was instituted. As discussed previously, this contract called for resurvey of a set of shoreline sites, all but one of which had been recorded by ISU during their reconnaissance-level surveys and monitoring operations. Selection of the sites to be examined was done jointly by the USAED-Rock Island District Archaeologist and the State Historic Preservation Office, on the basis of location, research potential and the extent of knowledge about each site. The resurvey process focused on confirmation of recorded site locations, definition of vertical and horizontal site boundaries, and tentative identification of temporal and functional attributes. After resurvey was completed, the ten sites which appeared to hold the most potential for yielding usable information were more intensively tested. The results of intensive testing were reported to the Corps of Engineers in the winter of 1982, and recommendations were made for the mitigative actions which are described in this report.

Although a great number of sites have been recorded during the survey projects conducted at Saylorville Lake in the past 15 years, only a relatively small number of sites have been investigated with any intensity. The majority of the recorded sites are known only from surface manifestations. Many sites which were never tested are now beneath the lake waters, and many more in the shoreline zone have been virtually destroyed by the action of waves and intermittent inundation. Continual erosion and a higher lake level will eventually threaten even those sites which lie in the upper portions of the flood-control pool. On-going research is therefore a necessity if any coherent picture of the prehistoric occupation of the Central Des Moines River Valley is to emerge.

METHODS

Geomorphological Studies

Field Investigations

Geomorphological investigations of six archaeological sites were conducted in August of 1983. The project geomorphologist and field assistant (a soil scientist) each spent about 70 hours documenting the surface form of the sites and describing and sampling the soils and underlying sediments. Surface forms of the sites were measured using a tape measure and clinometer. Changes in elevation were measured along 3 to 5 transects at each site. A station or turning point was established at each significant change in surface

form. Distance and percent slope from station to station were subsequently measured. The first station was established at the contact between the footslope of the hillside and alluvial fan or terrace, and transects were placed so as to cover the range in surface form of the site. Distances between stations subsequently were converted to horizontal distance for plotting on cross-section plans of each site.

Soils and underlying materials were investigated with hand-operated digging and probing tools, and from observations of all eroded exposures at the sites. Ten to twenty observations were made of the upper 50 cm of soil between stations on the transect lines to record the nature and thickness of the upper soil layers. On the basis of these observations a location was then selected for obtaining a detailed soil description and collecting samples. These were obtained from hand-dug pits at all sites except 13PK276. There, the eroded bluff was used for describing and sampling. Soils and underlying materials were classified according to standards of the National Cooperative Soil Survey (Soil Survey Staff 1951, 1975, 1981). At each site, photographs of surface form and the described soil were taken.

Laboratory analysis

Each soil sample collected was divided into two parts. One was submitted for laboratory analysis, and the other was retained as an archival sample. Samples were analyzed by the University of Minnesota Soil Survey Investigations Laboratory with standard procedures of the National Cooperative Soil Survey (Soil Survey Staff 1972).

Archaeological Studies

Field Investigations

Two major methods of subsurface investigation were used during fieldwork. During the quick assessment phase, shovel tests were used to evaluate the extent of disturbance to the vertical component of each site. These tests were a minimum of 30 cm square in size, and were dug in 10-cm artificial levels. All backdirt was processed through 1/4-inch wire mesh screens, and any recovered artifacts were noted as to test location and level.

During the excavation phase of the project, excavation units of variable size were the primary means of data recovery. Three different sizes of excavation unit were used: 50 cm square, 50 cm by 1 meter, and 1 meter square. The choice of unit size was based on the configuration and size of each site, the locations of previous test units, and such factors as the presence of trees and tree stumps. Each unit was excavated by trowel in 5-cm artificial levels. (In a few instances, heavy overburden or disturbed strata were removed with shovels.) The larger units were divided into halves or quadrants for record-keeping purposes, so the largest discrete provenience area in any unit was 50 cm2. All backdirt was screened as for shovel tests. All features encountered were mapped in planview and cross-section. One hearth which was uncovered during excavation was entirely removed, bagged, and floated in the laboratory. A sample of soil from an area outside the hearth was also taken for comparison purposes. Any organic materials suitable for radiocarbon assay were separately packaged in sterile wrapping in the field.

Because of the extent to which the subject sites have been disrupted by inundation and wave action, very little emphasis was placed on surface collection as a means of data recovery. Some collection of surface material

was done at each site, primarily as a way of assessing recent disturbance and, in a few cases, to retrieve artifactual materials which were in reliable association with the site area. However, the conclusions presented in this report about the cultural affiliations, functions and general configurations of the subject sites are based almost entirely on information recovered from subsurface context.

Laboratory analysis

Preliminary analysis of recovered materials consisted of cleaning and cataloguing, according to a system approved by the Iowa Office of the State Archaeologist. A series of analytical procedures were then applied to the recovered lithic and ceramic artifacts. Ceramics were first morphologically described, and reconstruction of partial vessels was done when possible. Then, each decorated sherd was evaluated according to typologies established for Iowa and surrounding states (references listed in Section IV), and probable type designations were assigned. Lithic materials were also described in terms of both morphology and material type. These artifacts were then divided into two groups: tools and debitage. Each tool was given a descriptive name on the basis of form. Projectile points were compared to established taxonomies, using the references listed in Section IV, and were given type names when possible. Lithic debitage was subdivided into several classes of material: cores and core fragments, primary, secondary and retouch flakes.

Analysis of wear patterns on lithic tools and utilized flakes was done according to a procedure developed at the Mankato State University Archaeology Lab (described in Losleben & Strachan 1978). Tools and utilized flakes were examined under a light microscope, and a material-specific flowchart of wear patterns was used to, first, determine the action that had been performed with the artifact and, second, determine the material or materials that had been worked. In some cases, the action could be defined, but the nature of the lithic material or repeated use of the tool made it impossible to determine what type of material had been worked.

Samples for radiocarbon analysis were given a preliminary cleaning in the lab, weighed and submitted to Beta Analytic, Inc. for processing. The results obtained are presented in Appendix III, Volume II. The soil samples taken in the field were floated through a series of geologic screens, and the recovered materials were hand-sorted and grouped into general categories. Organic materials were microscopically examined, described and identified as to genus and species when possible. All materials recovered during fieldwork are presently maintained in temporary curation by the Contractor, pending final disposition.

II. RESEARCH RESULTS

SITE DESCRIPTIONS

In the following pages, the seven sites which were examined during this project will be described in detail. For each site, a summary of previous work will first be given. A detailed description of geomorphic position, soils and surface form will then be presented, followed by a description of the data recovery done during the 1983 field season, including summary charts of recovered materials. Several maps are included for each site, showing the general configuration of the site area, small-scale diagrams of excavation units, particular artifact concentrations and feature locations. Detailed descriptions of specific artifacts can be found in the sections on lithic and ceramic analysis, and detailed soils descriptions and laboratory analyses are presented in Appendix II. (Note: unless otherwise specified, all ceramics listed in summary charts are grit-tempered.)

13PK23

This site was originally recorded in 1980, by shoreline monitors from ISU, as part of 13PK314. That site had been defined as being about 10 acres in size, on the basis of surface artifact scatters found along the shoreline of Saylorville Lake. The original site form notes that surface artifacts were somewhat more concentrated in the very southern and very northern portions of the entire area, although they were found in a continuous scatter along the shoreline. No subsurface testing was done at the time the site was initially recorded.

During the course of resurvey and testing at 13PK314, two quite distinct artifact concentrations were identified. One, which retained the designation 13PK314, was located on a remnant of an alluvial fan at the northern end of the original site area. The second concentration was located on another fan remnant at the southern end of the area. The portion of shoreline between these two concentrations was devoid of any cultural deposit, with the exception of a few translocated surface artifacts. Examination of the stratigraphy of this area showed that it was actually an old drainageway between the fans that had been filled in by recent sediments, probably transported by floodwaters, sheet erosion and ice shove. After excavations in the two areas of concentration were completed, a summary of the recovered information was submitted to the Iowa Office of the State Archaeologist, with the request that one of the cultural deposits be assigned a different site number. It was at this time that the southern portion of 13PK314 was redefined as 13PK23 (see Appendix VI). (Note: it is probable that the designation 13PK23 was previously used to refer to a different site. Care should therefore be taken when dealing with references to this site number that pre-date 1984.)

Geomorphic Description

Because the separation of these two sites was not made official until the 1983 field season was over, geomorphological investigations did not focus on both site areas, and detailed studies were done only at the northernmost

site (13PK314). No detailed description of the surface form of 13PK23 has therefore been done. During the 1982 field season, however, the area was identified as an alluvial fan which has been radically truncated by incisement of a drainageway along its present southern edge. The general characteristics of alluvial fans presented in the discussion of 13PK274 therefore apply to 13PK23.

Archaeological Investigations

When this site was first visited in 1982, the effects of inundation and wave action were readily apparent. Much of the A soil horizon had been removed in portions of the fan, leaving scattered "micro-terraces" which were 10 to 20 cm higher than the rest of the fan. A number of artifacts were found eroding out of the edges of these micro-terraces. Subsurface testing therefore concentrated on these areas of relatively intact stratigraphy. Very few artifacts were found in test units, which suggested that the actual occupation level of the site had already been eroded away. A series of post-molds forming a roughly right-angled corner were found in one test unit.

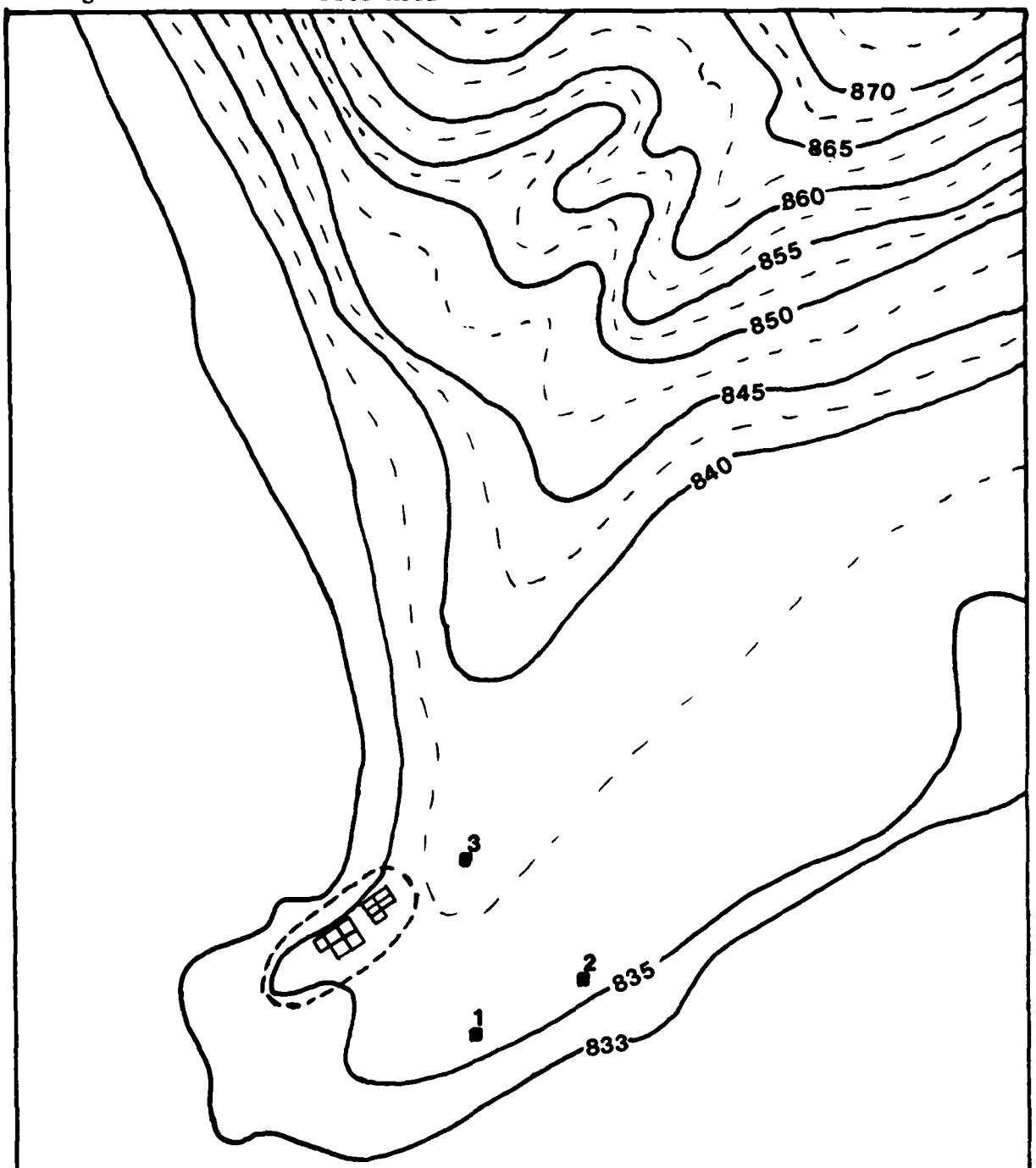
On the basis of the materials recovered during the initial surface survey of this site and the resurvey and testing done by Impact Services, it was identified as a Late Woodland habitation area, most of which had already been destroyed by truncation of the fan upon which the site is located. Numerous ceramic sherds were found on surface, including a number of rims of a typical Late Woodland single-cord-impressed style. Although the decorative motifs on these sherds resemble such types as Minott's Cord-Impressed, the morphology of the vessels did not fit the definition of vessel form for such types.

Because the site appeared so badly eroded in 1982, it was assumed that it would be possible to remove the entire remaining portion of the site area during data recovery. During the quick assessment phase of work, it was noted that one small area on the extreme southwestern edge of the fan remnant had survived the spring floods and was not yet eroded down to subsoil. (The three test units in which the postmolds were uncovered in 1982 were in this area.) A brief examination of the fan's surface yielded a quantity of lithic debitage, several tools, and a number of body, shoulder, neck and rim sherds. Many of these artifacts were found just along the water's edge, as had been the case in 1982, and some were found eroding out of the fresh scarp faces along the fan remnant.

It had already been established that the small intact area in the southwestern corner of the fan remnant did contain cultural material, so no subsurface testing was done in this location during quick assessment. Three shovel tests were placed further north, close to the filled-in drainageway, to check for an extension of the cultural deposit in this direction (see Figure 5). Since these shovel tests yielded no cultural materials, excavation focused on removal of the remainder of the fan remnant which had not been tested in 1982.

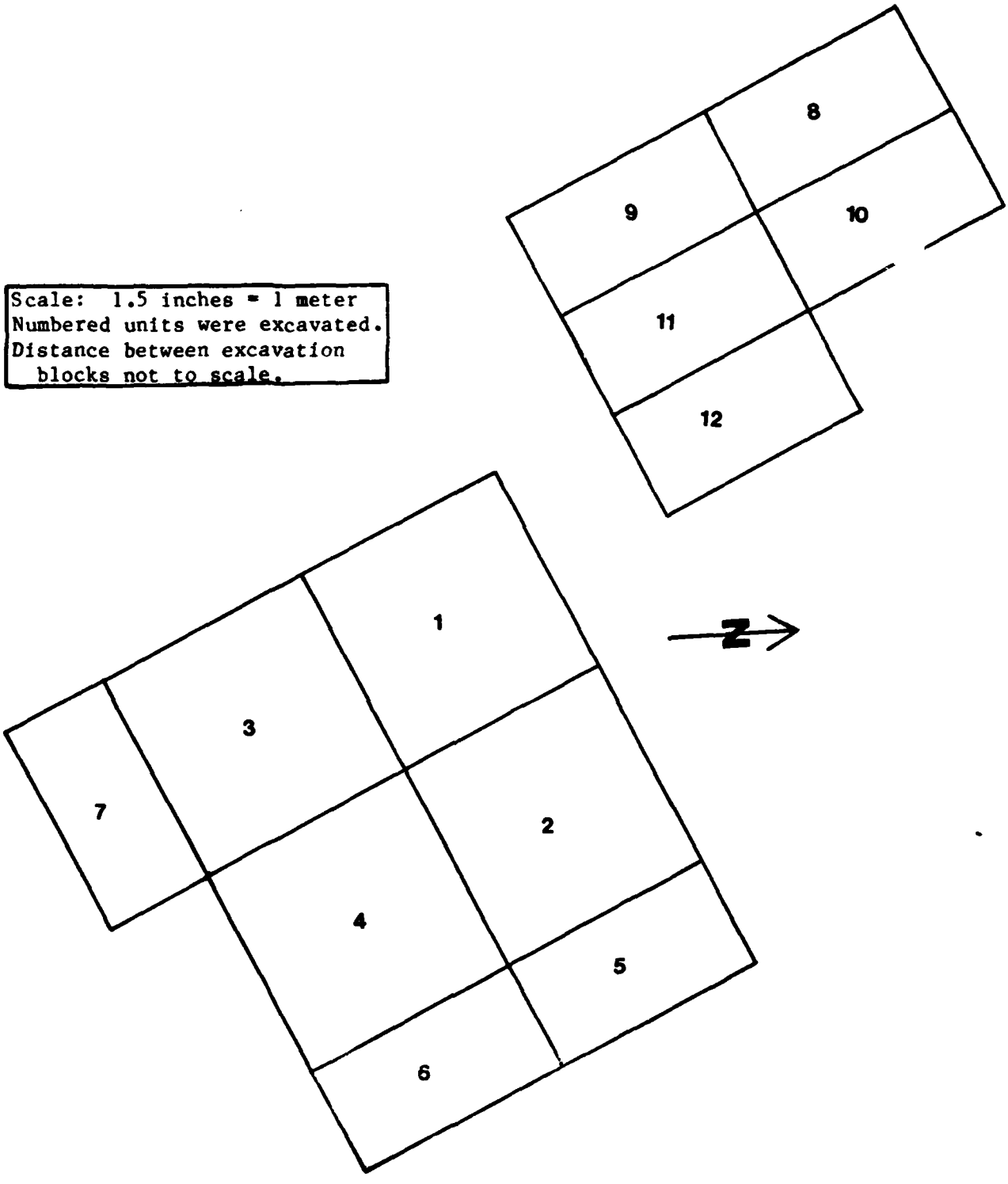
Excavation units were laid out to cover the entire fan remnant, and were placed along the edges of the old test units. In total, four 1-meter square units and eight 50 cm x 1 meter units were excavated (see Figure 6). Units 5 and 6 were on the very eastern edge of the fan remnant, and could not, in fact, be completely excavated, because they extended into the truncated portion of the fan remnant.

Figure 5. 13PK23 - Site Area



Scale: 1 inch = 45 feet.
Shovel Test: ■
Excavation Units: ⊡
Site Area Boundary: - - - - - - -
833' contour line was normal lake level prior to October 1983.
(See Figure 6 for detail of excavation units.)
Taken from USACE aerial photographs.

Figure 6. Excavation Units at 13PK23



Cultural materials found in the excavation units were rather generally dispersed, with no particular horizontal pattern of distribution. Their vertical distribution was concentrated in the top 15 cm of soil. Most of the artifacts found below this level were rather small in size and may have been moved downward by frost action. (The materials recovered during excavation are listed in Figure 7.) A few small pieces of orange-colored ochre were found scattered through Units 1, 2, 3 and 4.

A series of postmolds was uncovered in Units 2, 3 and 4, appearing first at about 5 cm below the surface of the units. The diameter of the postmolds ranged from 8 to 12 cm when first encountered, and grew gradually smaller until the postmolds disappeared at depths between 12 and 14 cm below the surface. They appeared to be a continuation of the series of postmolds found in the test units excavated in 1982. Those features had first appeared at about 15 cm below surface and disappeared at about 25 cm. This disparity in depth is probably due mostly to sheet erosion which removed 10 cm or more of soil from the fan remnant between the 1982 and 1983 fieldseasons.

Figure 8 shows the orientation of the entire set of postmolds excavated over two years. They appear to outline one corner of a rectangular structure with an eastward extension. This partial structure cannot be functionally described with any certainty, however, since the western half of it had already been destroyed by erosion and could not be recovered. No related features such as trenches for support posts, remnants of construction materials or interior structures were uncovered in the excavation units.

The ceramics recovered from surface and during excavation can be divided into two groups, on the basis of morphology, surface treatment and decoration. The first group includes body sherds and a few undecorated rims. The other group includes a number of rim, neck and shoulder sherds decorated with thick (c. 0.3 cm) horizontal and, occasionally, diagonal cord impressions applied to the neck and shoulder. (See the section on ceramic analysis for a more complete description of these artifacts.) The decorated rims appear to be associated with the complex of single-cord-impressed ceramics of the Late Woodland period in both the Eastern Woodlands and the Plains. The undecorated sherds cannot be given any specific chronological position, although they probably are from an earlier period than the single-cord-impressed sherds.

The presence of a structure remnant indicates that this site was a habitation, a conclusion reinforced by the great quantity of ceramic sherds recovered from the site area. The shallowness of the postmolds, and the vertical distribution of artifacts in the excavation units, again, indicates that the main occupation level of the site was entirely destroyed before testing began. The site area undoubtedly once extended to the south, into what is now the mouth of a wide, deeply-incised drainageway. The two ceramic types represented in the artifact assemblage suggest that 13PK23 was, at one time, a multi-component site. This could not be confirmed through excavation, however, because of the loss of most of the cultural deposit to erosion prior to 1982.

Figure 7. Material Recovered at 13PK23

Surface

4 core fragments
9 primary flakes
57 secondary flakes
4 blade flakes
4 tool fragments
2 scrapers
1 projectile point, corner-notched
19 body sherds, cr*
86 body sherds (e)*
15 ceramic crumbs*
1 neck/shoulder juncture (e)
2 shoulder sherds, cr
3 neck sherds:
  1 cord-impressed
  1 cord-impressed/zoned
  1 eroded
3 rim sherds:
  1 cord-impressed with tool-impressed lip
  1 cord-impressed/zoned
  1 cr, bossed/incised
1 historic glass bottle, initialed "W.B.M."

Unit 1

0-5 cm, NW: 1 tool fragment
" NE: 1 secondary flake
" " 1 scraper
" " 1 ceramic crumb
" SE: 2 secondary flakes
" SW: 1 body sherd (e)
5-10 cm, SE: 1 secondary flake
" " 1 ceramic crumb
" SW: 1 turtleback scraper
10-15 cm, SE: 1 secondary flake

Unit 2

0-5 cm, NE: 1 body sherd, cr
" SW: 1 secondary flake
" " 1 body sherd, cr
5-10 cm, NW: 1 secondary flake
" NE: 1 secondary flake
" SW: 1 secondary flake

Unit 3

0-5 cm, NW: 1 secondary flake
5-10 cm, SE: 1 retouch flake
" " 1 body sherd, burned
" SW: 1 secondary flake
" " 1 body sherd, cr

Unit 4

0-5 cm, NW: 1 secondary flake
" SE: 2 secondary flakes
" SW: 1 body sherd (e)
" " 1 ceramic crumb
5-10 cm, NE: 1 secondary flake
" " 1 body sherd (e)
" " 1 ceramic crumb
" SW: 1 core fragment
10-15 cm, NW: 1 primary flake
" SE: 2 secondary flakes
15-20 cm, NE: 1 secondary flake
" SE: 1 primary flake
" " 1 secondary flake
20-25 cm, SE: 3 secondary flakes

Unit 5

0-5 cm, S: 1 secondary flake
10-15 cm, S: 1 secondary flake

Unit 6

0-5 cm, S: 1 secondary flake
5-10 cm, N: 3 secondary flakes
" " 1 retouch flake
10-15 cm, N: 2 secondary flakes
" S: 2 secondary flakes
15-20 cm, N: 2 secondary flakes
" S: 2 secondary flakes
20-25 cm, N: 1 primary flake
" S: 1 primary flake
" " 1 secondary flake
" " 1 blade flake
25-30 cm, N: 2 secondary flakes
" S: 4 secondary flakes

Unit 7

5-10 cm, W: 1 body sherd (e)
10-15 cm, E: 1 secondary flake

Unit 8

0-5 cm, S: 2 secondary flakes
" " 1 body sherd (e)
5-10 cm, N: 1 primary flake

Unit 9

0-5 cm, S: 1 secondary flake
5-10 cm, N: 1 body sherd (e)
20-25 cm, S: 1 ceramic crumb

Unit 10

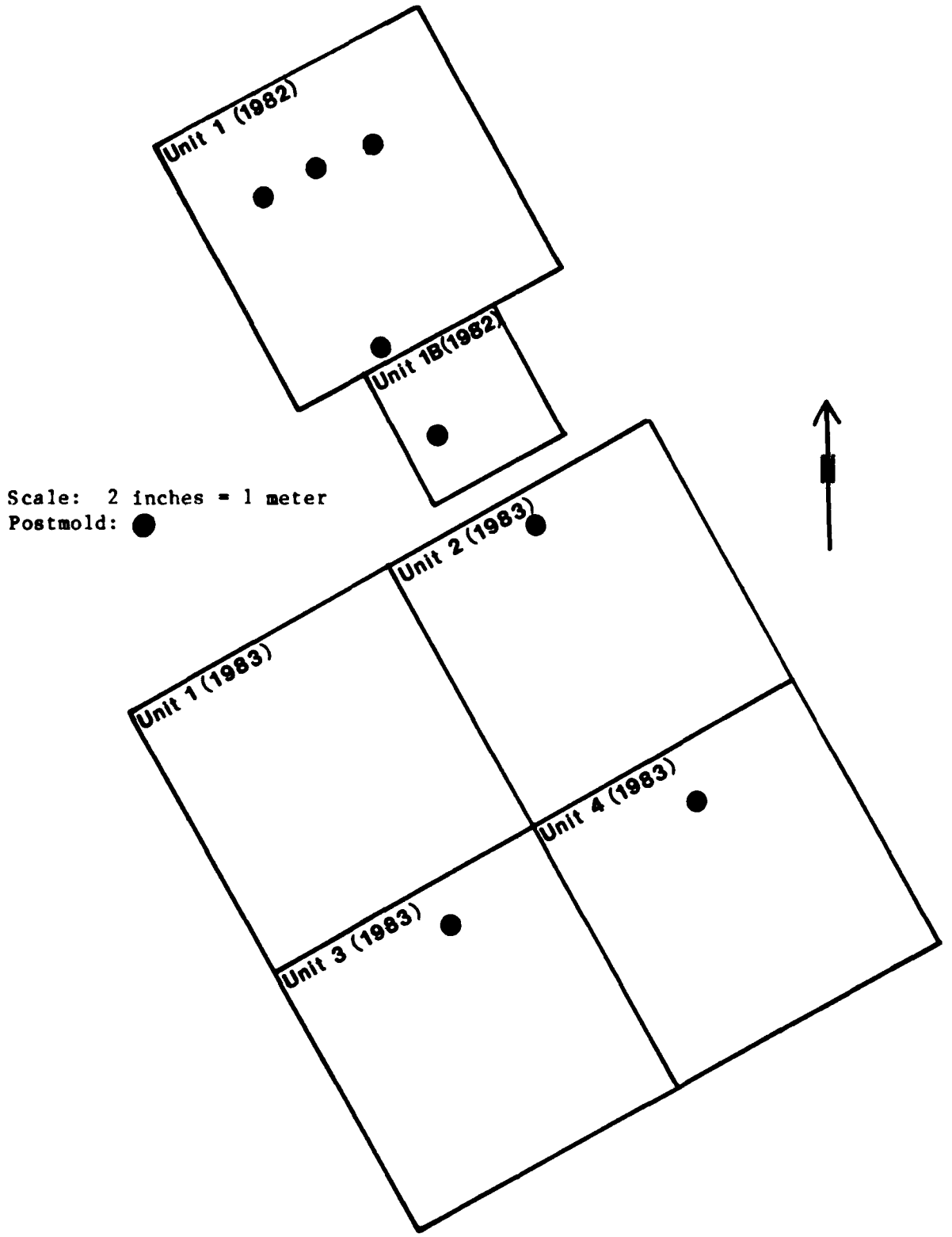
0-5 cm, N: 2 secondary flakes
" S: 1 body sherd (e)
10-15 cm, N: 1 primary flake
" " 1 secondary flake
15-20 cm, S: 1 secondary flake

Unit 11

0-5 cm, N: 1 secondary flake
" S: 1 primary flake
" " 1 secondary flake
15-20 cm, N: 1 secondary flake

* "cr" = cord-roughened; "(e)" = eroded; "crumb" refers to a non-diagnostic ceramic remnant less than 1 cm2.

Figure 8. Structure Remnant at 13PK23



13PK259

This site was first recorded by ISU personnel in 1976, on the basis of surface materials found in a cultivated field just above the Des Moines River floodplain, on the north side of the valley. Subsurface testing in 1982 revealed that the site had been disturbed in its upper reaches by cultivation, and the terrace had been truncated on its southern edge by erosion, probably after the impoundment of waters behind Saylorville Dam. However, a substantial cultural component did remain relatively intact. Artifacts recovered during resurvey and testing suggested that the site was a special-activity area, possibly a hunting and/or butchering camp, with a suggestion of multi-componency. Its location at the confluence of Mosquito Creek and the Des Moines River, on a landform that was dominated by prairie vegetation, would have made it a favorable area for hunting large fauna.

Several large mammal teeth found on site during 1982 were identified as being from members of order Bovidae, which includes the genera Bison (bison), Bos (domestic cow), Capra (domestic goat) and Ovis (domestic sheep). An additional bovid tooth was found at 30 cm below surface in excavation unit #36 during data recovery in 1983. The depth at which this tooth was found does seem to indicate pre-settlement deposition, and it can be classified as belonging to either genus Bison or genus Bos. However, in the absence of a full mandible and other cranial structures, it is not possible to absolutely distinguish among teeth from members of these genera. The teeth found at 13PK259 might, therefore, reflect historic rather than prehistoric subsistence activities.

Geomorphological Description

13PK259 is located on an old terrace of the Des Moines River. The general surface form of the terrace is shown in Plates 1 and 2, and a schematic representation of its landform components is presented in Figure 9. (Because of its proximity and geomorphic similarity to 13PK259, the terrace upon which 13PK264 is located will also be discussed here.) The components include the footslope and toeslope of the steep hillside on the northern side of the site area, channels or chutes which have been cut by rising lake waters, the main portion of the terrace and the truncated terrace edge which has been filled with recent alluvium (see Plates 4 and 5). Component C6 is a lower terrace formation upon which 13PK264 is located.

Cross-section views of the two terraces are shown in Figure 10. These diagrams show the major stratigraphic units that can be identified in the terraces. Unit S1 represents the recent sediments that have accumulated along the truncated edge of 13PK259, as well as the sediments which comprise the upper 1 meter of 13PK264. Unit S2 is the location of a buried soil at 13PK264, and Unit S3 is the sediment which comprises most of the 13PK259 terrace. Comparison of the particle composition of these three sediments shows that S1 is considerably higher in sand content and lower in clay content than the other two sediments. This, again, indicates that it is a translocated, recent sediment.

Detailed descriptions were done of the soil in the main part of the 13PK259 terrace. The uppermost soil horizon is a "C" horizon of post-Saylorville sand, about 4 cm thick. This is underlain by an "Ap" horizon of

Figure 9. Landform Components at 13PK259/13PK264

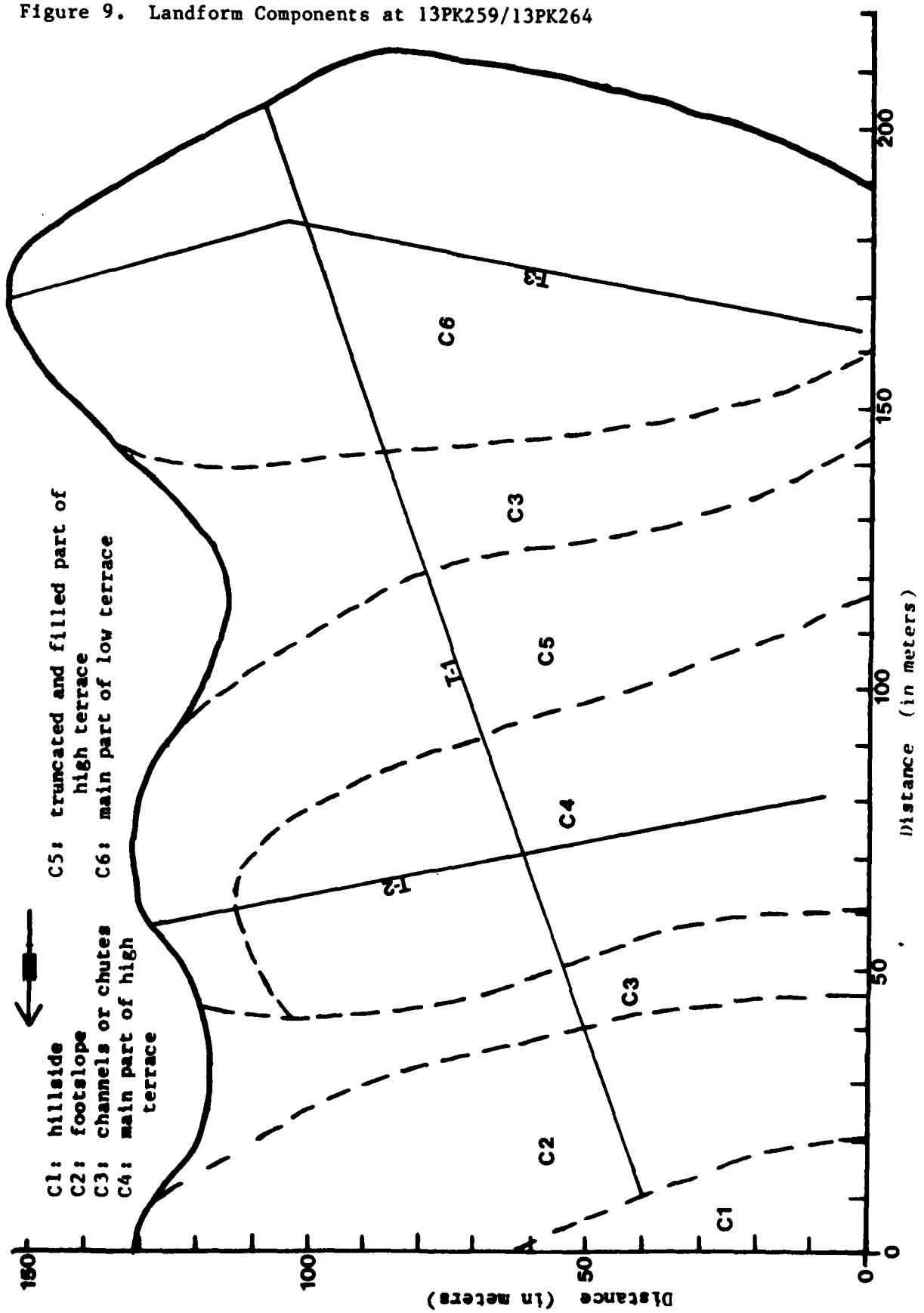
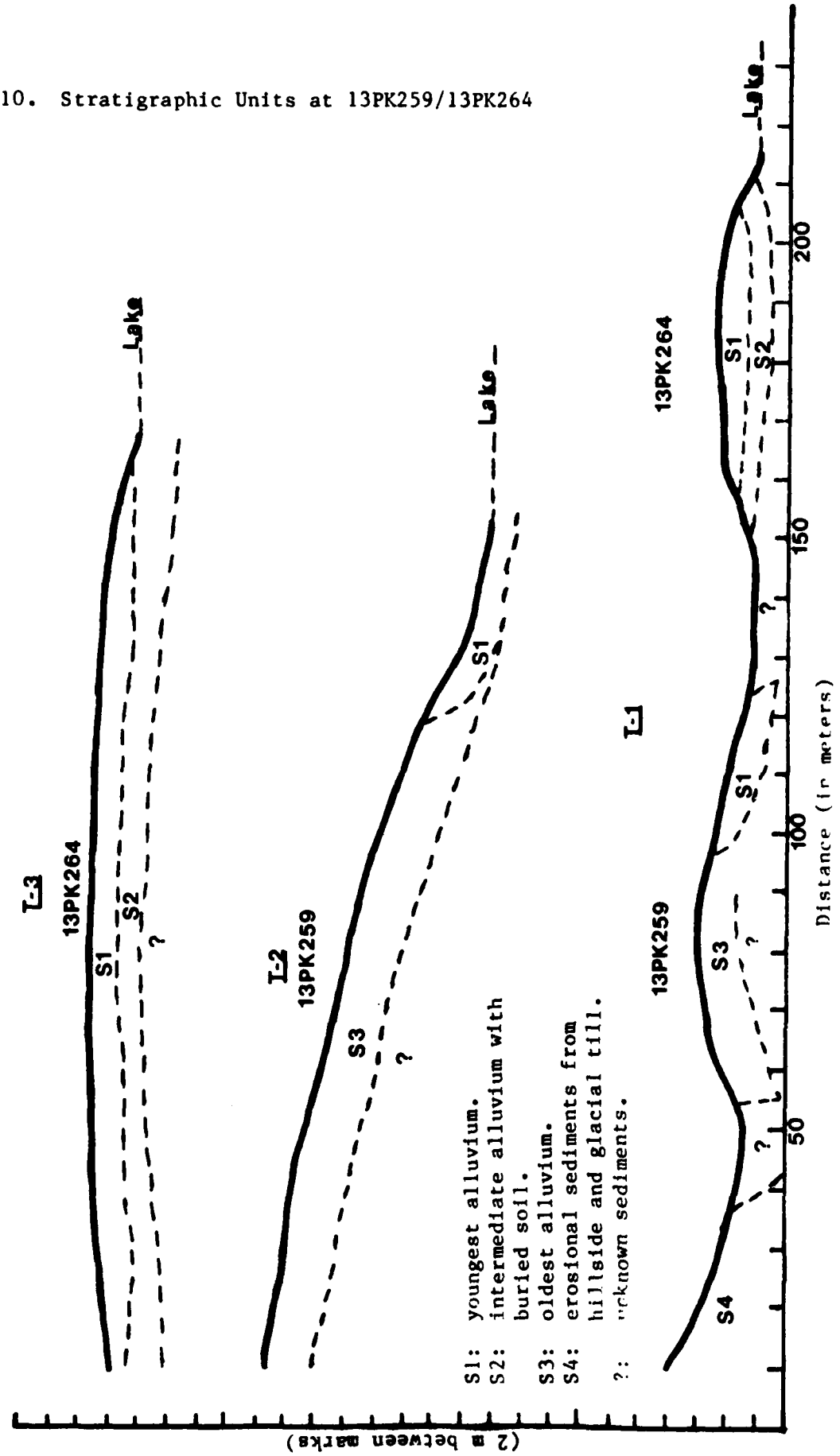


Figure 10. Stratigraphic Units at 13PK259/13PK264



black loam from 4 to 24 cm and an "A2" horizon of dark grayish brown loam from 24 to 35 cm. From 35 to 70 cm is the "Bt1" horizon which contains evidence of translocated clay. (The total depths of these horizons do vary within the main terrace, ranging from as shallow as 40 cm to as deep as 80 cm.) This soil can be classified as an Aquic Hapludoll, a moderately well-drained soil which developed mostly under prairie vegetation (see Plate 6).

The geomorphological investigations conducted in 1982 resulted in the tentative classification of this landform as analogous to either the "high terrace" or "intermediate terrace" of Benn & Harris' (1982) model of landscape development in the Downstream Corridor. Further observations of the degree of soil development on landform component C4 at 13PK259, coupled with the results of laboratory analyses of that soil, indicate that placement with the "high terrace" is the most appropriate classification. This would indicate an age for this landform of between 4,000 and 5,000 BP.

This terrace is one of the few remnants of the "high terrace" system which remains above the lake level upstream from Saylorville Dam. It appears to be essentially intact, even though somewhat truncated along its southern and possibly eastern edges by lakewaters. It is probable that the recent (probably post-settlement) accumulation of sediments on top of the lower terrace (the location of 13PK264) has afforded it some protection from the effects of continual wave action.

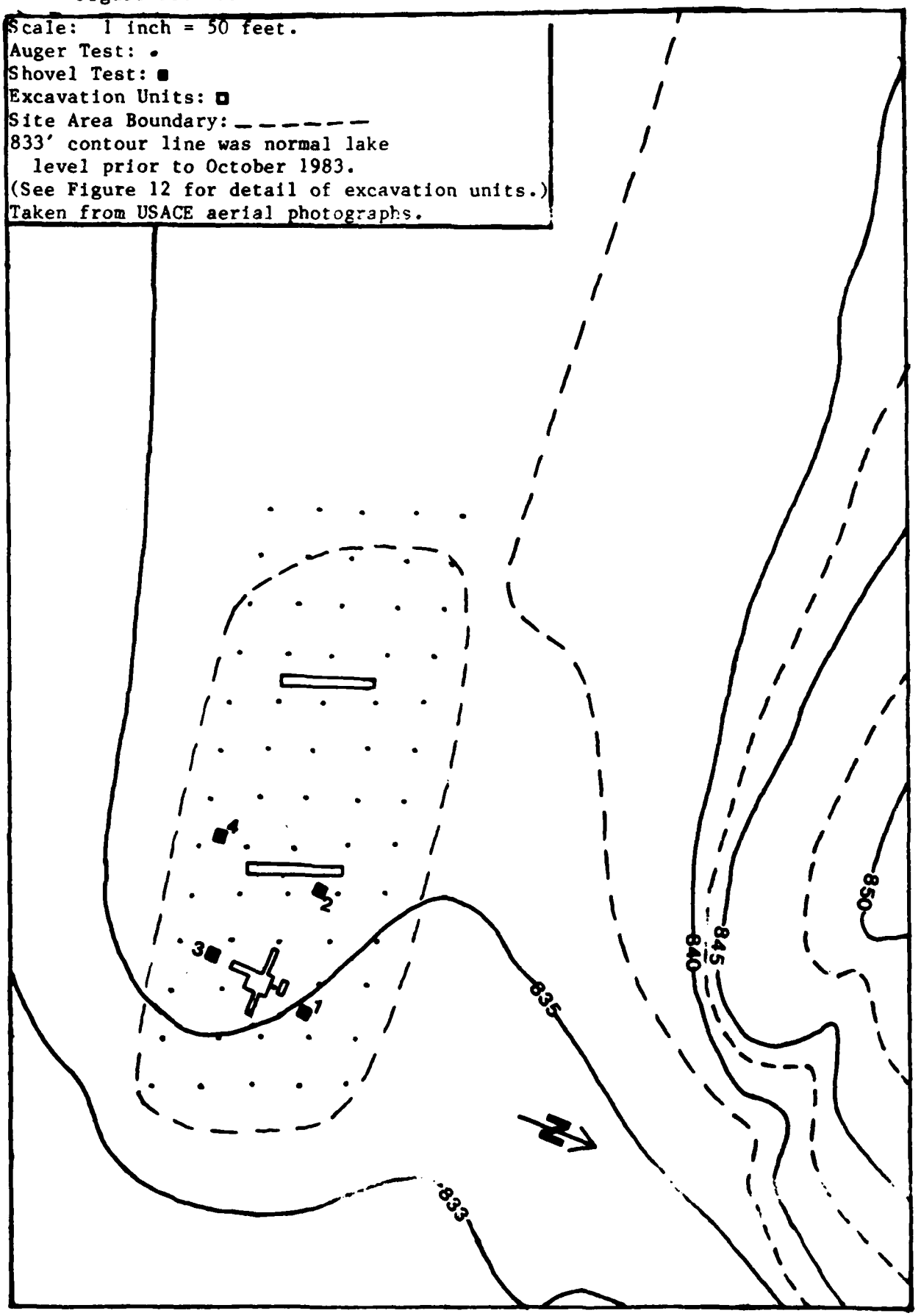
Archaeological Investigations

The results of resurvey and testing at 13PK259 had shown that the site area was relatively large (covering most of the main part of the terrace), and that an intact portion of the cultural deposit existed below the plow zone. The overall goal of the data recovery program conducted here was therefore to obtain a broad horizontal and vertical picture of the occupation area. The first task was to determine the extent to which the cultural deposit had been disrupted by spring flooding. Because a fresh layer of sand had been deposited by receding floodwaters, the actual surface of the terrace could not be readily observed. Four shovel tests were done on the main part of the terrace in order to evaluate the condition of the subsurface deposit (see Figure 11). These tests showed that the cultural deposit had survived the winter and spring with very little adverse affect.

(When the research team first viewed this site in 1983, a curious phenomenon was observed. A pair of aligned trenches, each approximately 50 cm wide, had been cut into the north and south sides of the terrace midsection. These trenches were about 25 cm deep close to the top of the terrace, and gradually got shallower until they disappeared at the bottom of the sideslopes. A number of alternative hypotheses were advanced to account for the formation of these trenches. It was finally determined that they had been created by propeller blades on a boat that had bottomed out on the terrace while lake waters still covered the site - another example of adverse effect to cultural resources by recreational activities.)

Because the actual horizontal extent of 13PK259 had not been precisely determined during intensive testing, a preliminary objective of data recovery was to define site boundaries. Another goal was to identify the areas within those boundaries which would be likely to yield the most information about the nature of the site. The previous year's research and the geomorphological

Figure 11. 13PK259 - Site Area



analysis of the 13PK259 terrace had indicated that there was no discernable subsurface stratigraphy of any cultural significance. The artifact deposit was relatively consistent, although sparse, in all areas that had already been tested, and no particular concentrations of artifactual material had been noted.

Close-interval auger testing was chosen as an appropriate technique for defining site boundaries and selecting areas for excavation at 13PK259. It was felt that the use of a small-diameter (c. 6 cm) auger to check subsurface artifact distribution was a low-disturbance technique which would provide sufficient evidence to identify site boundaries and productive areas for excavation. Vertical provenience could be maintained to a sufficient degree to illuminate the subsurface distribution of artifacts, while the use of the auger would be more time-effective than standard shovel testing.

Auger testing was implemented by laying out a 5-meter test grid over the entire site area, as defined on the basis of the 1982 resurvey and testing results. As each auger test was dug, the soil removed was screened and any artifacts that appeared were retained. (A gas-powered auger was used at first, but serious mechanical difficulties made it necessary to resort to the use of a hand auger for the majority of the tests.) As it turned out, the grid of auger tests was quite useful in identifying site boundaries, but did not locate any significant concentrations of artifacts.

After the auger tests were completed, the results were inventoried (as shown in Figure 12), and the western boundary of the site area was readily identified. The eastern boundary of the site was defined as the edge of the Mosquito Creek drainageway, and the northern and southern boundaries were defined as the sideslopes of the terrace. No striking differences in artifact concentrations were revealed by the auger tests, nor was any evidence of the presence of features found.

An initial line of excavation units was laid out close to the center of the site area, because the auger tests here had revealed a slightly higher artifact concentration than was noted in other parts of the site. A line of adjoining, 50-cm square units was laid out between Auger Tests #21-25 and #26-30, running north-south. In order to maximize horizontal coverage, roughly every third unit excavated (Units 1, 4, 7, 10, 13, 16, 19 and 21). (The locations of all excavation units are shown in Figure 13, and a list of recovered materials is presented in Figure 14.)

Moderate quantities of debitage were recovered from all of these units, at depths ranging from surface to 45 cm. The cultural deposit appeared to be quite consistent in vertical and horizontal distribution. Soil stratigraphy showed that the old plow zone extended to between 20 and 25 cm. Below this depth, the soil strata appeared to be intact and undisturbed. Since nothing of particular significance was found in the 8 units initially excavated, no further work was done in this location.

Because a body sherd had been found in Auger Test #43, the next line of excavation units was placed near that location, in hopes that diagnostic sherds might be found. This line was close to the western boundary of the site area, parallel to the auger test grid, running north-south. Initially, every third unit in the line (Units 21, 24, 27, 30, 33, 36 and 39) was excavated.

Figure 12. Results of Auger Tests at 13PK259

Tests #1-5:	1	2	2	-	2
Tests #6-10:	-	3	2	1	-
Tests #11-15:	1	2	-	3	2
Tests #16-20:	1	1	3	1	1
Tests #21-25:	5	2	5	-	4
Tests #26-30:	1	2	-	2	3
Tests #31-35:	1	4	-	-	2
Tests #36-40:	-	-	-	1	1
Tests #41-45:	1	2	2	-	1
Tests #46-50:	2	1	1	5	-
Tests #51-55:	-	-	-	1	1
Tests #56-60:	1	-	-	-	-
Tests #61-65:	-	-	-	-	-

Numbers in grid indicate artifacts recovered from each auger test.

Test numbers increase north to south and east to west.

Figure 13. Excavation Units at 13PK259

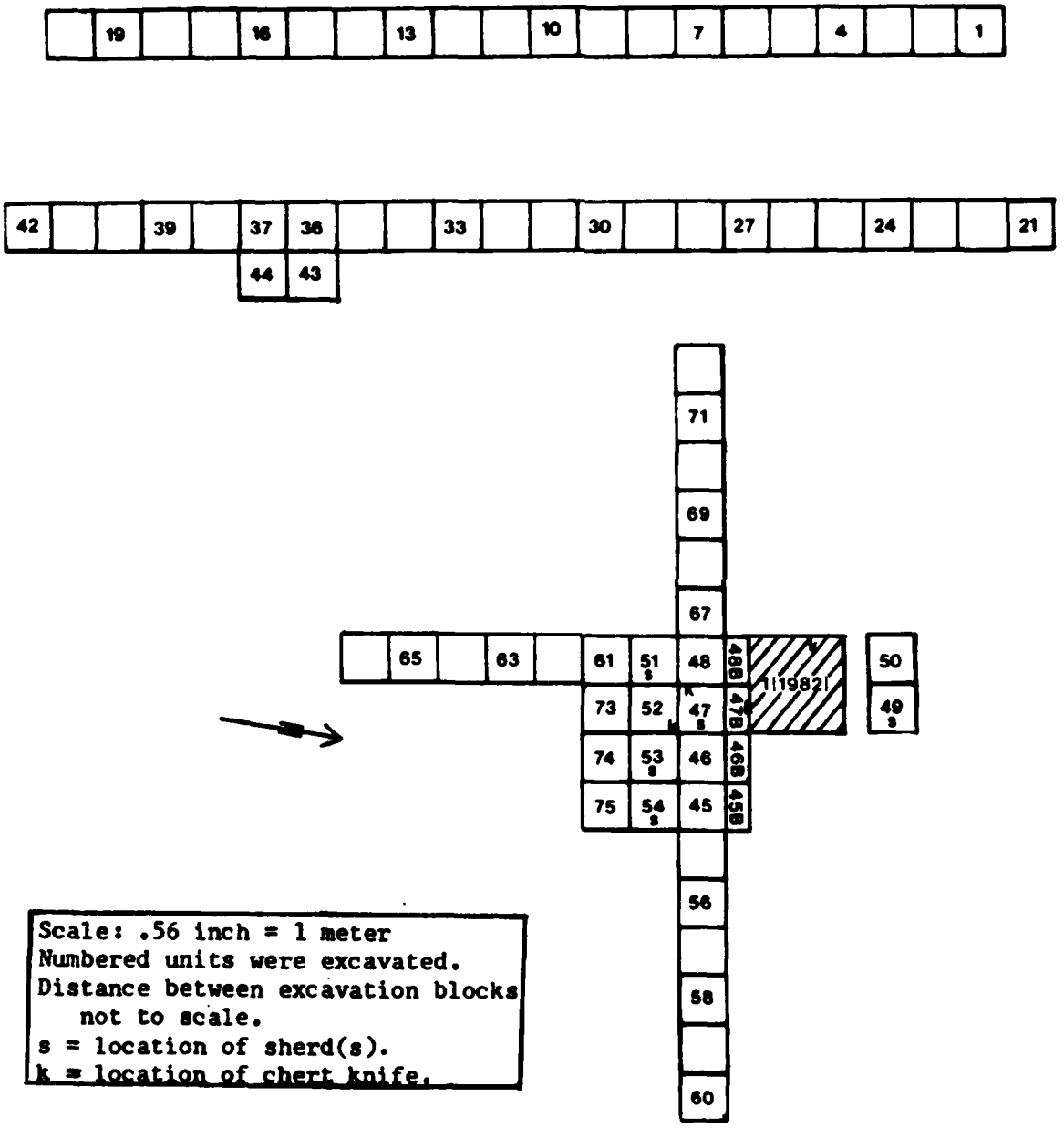


Figure 14. Material Recovered from 13PK259

Surface

General:	4	core fragments
	1	primary flake
	40	secondary flakes
	2	retouch flakes
	3	blade flakes
	2	tool fragments
	1	end scraper
	1	punch/graver
Grid 1:	1	core fragment
	9	secondary flakes
	1	blade flake
	4	retouch flakes
Grid 2:	1	core fragment
	1	primary flake
	29	secondary flakes
	4	retouch flakes
Grid 3:	2	primary flakes
	29	secondary flakes
	10	retouch flakes
Grid 4:	6	secondary flakes
Grid 5:	2	secondary flakes
	1	body sherd (e)
Grid 6:	1	primary flake
	5	secondary flakes
	1	blade flake
	16	retouch flakes
Grid 7:	1	core fragment
	7	secondary flakes
	4	retouch flakes
Grid 8:	1	secondary flake
	2	retouch flakes
Grid 9:	1	secondary flake
	1	retouch flake
Grid 10:	1	secondary flake
	1	retouch flake
Grid 11:	1	secondary flake
	4	retouch flakes
Grid 12:	2	secondary flakes
	5	retouch flakes
Grid 13:	1	secondary flake
	2	retouch flakes

Auger Tests

A-1:	1	secondary flake
A-2:	2	secondary flakes
A-3:	1	secondary flake
	1	charcoal fragment
A-5:	1	secondary flake
	1	retouch flake
A-7:	3	secondary flakes
A-8:	1	retouch flake
	1	charcoal fragment
A-9:	1	retouch flake
A-11:	1	tooth fragment
A-12:	2	secondary flakes
A-14:	1	core fragment
	1	secondary flake
A-15:	2	secondary flakes
A-16:	1	retouch flake
A-17:	1	primary flake
A-18:	2	secondary flakes
	1	blade flake
A-19:	1	petrified wood frag.
A-20:	1	secondary flake
A-21:	5	retouch flakes
A-22:	1	secondary flake
	1	retouch flakes
A-23:	4	secondary flakes
	1	retouch flake
A-25:	1	secondary flake
	2	retouch flakes

Auger Tests, cont.

A-25:	1	bone frag., burned
A-26:	1	retouch flake
A-27:	1	primary flake
	1	secondary flake
A-29:	2	secondary flakes
A-30:	2	secondary flakes
	1	retouch flake
A-31:	1	retouch flake
A-32:	1	core fragment
	2	secondary flakes
	1	retouch flake
A-35:	1	secondary flake
	1	retouch flake
A-39:	1	retouch flake
A-40:	1	retouch flake
A-41:	1	retouch flake
A-42:	1	secondary flake
	1	retouch flake
A-43:	1	secondary flake
	1	body sherd (e)
A-45:	1	primary flake
A-46:	2	retouch flakes
A-47:	1	secondary flake
A-48:	1	retouch flake
A-49:	1	secondary flake
	4	retouch flakes
A-54:	1	retouch flake
A-55:	1	secondary flake
A-56:	1	secondary flake

Shovel Test #1

0-10 cm:	1	secondary flake
10-20 cm:	2	secondary flakes
20-30 cm:	1	retouch flake

Shovel Test #2

0-10 cm:	3	secondary flakes
"	1	retouch flake
10-20 cm:	2	retouch flakes
20-30 cm:	4	secondary flakes
"	4	retouch flakes
30-40 cm:	1	secondary flake
40-50 cm:	1	secondary flake

Shovel Test #3

0-10 cm:	2	secondary flakes
10-20 cm:	1	secondary flake
"	1	retouch flake
20-30 cm:	1	secondary flake
30-40 cm:	1	secondary flake
40-50 cm:	1	secondary flake

Shovel Test #4

0-10 cm:	6	secondary flakes
"	1	ceramic crumb
10-20 cm:	1	retouch flake

Unit 1

0-10 cm:	1	secondary flake
"	2	retouch flakes
10-20 cm:	2	secondary flakes
"	5	retouch flakes
20-25 cm:	1	secondary flake
"	2	retouch flakes

Unit 4

0-10 cm:	3	secondary flakes
"	1	tool fragment
10-20 cm:	1	secondary flake
25-30 cm:	1	secondary flake
30-35 cm:	2	retouch flakes

Figure 14, continued

Unit 7

0-10 cm:	1 secondary flake
"	1 retouch flake
10-20 cm:	1 secondary flake
"	4 retouch flakes
20-25 cm:	2 secondary flakes
"	1 retouch flake
25-30 cm:	1 primary flake
30-35 cm:	1 secondary flake
"	1 retouch flake
20-25 cm:	2 secondary flakes
"	3 retouch flakes
25-30 cm:	1 secondary flake
30-35 cm:	2 retouch flakes
40-45 cm:	1 retouch flake

Unit 10

0-10 cm:	2 secondary flake
"	2 retouch flakes
10-20 cm:	1 secondary flake
"	1 retouch flake
"	1 bone fragment

Unit 13

0-10 cm:	3 secondary flakes
"	1 retouch flake
"	1 tool base
10-20 cm:	1 secondary flake
"	1 retouch flake
20-25 cm:	1 retouch flake
25-30 cm:	1 retouch flake
35-40 cm:	1 retouch flake

Unit 16

10-20 cm:	1 primary flake
"	3 secondary flakes
"	1 retouch flake
20-25 cm:	4 secondary flakes
"	3 bone fragments
25-30 cm:	2 secondary flakes

Unit 19

0-10 cm:	3 secondary flakes
"	2 retouch flakes
10-20 cm:	5 secondary flakes
20-25 cm:	1 retouch flakes
25-30 cm:	1 retouch flake
30-35 cm:	2 secondary flakes

Unit 21

0-10 cm:	3 secondary flakes
10-20 cm:	1 retouch flake
25-30 cm:	2 secondary flakes

Unit 24

0-10 cm:	1 secondary flake
10-20 cm:	1 secondary flake
25-30 cm:	1 secondary flake
"	1 retouch flake
30-35 cm:	1 secondary flake
"	1 retouch flake
35-40 cm:	1 secondary flake
40-45 cm:	1 primary flake

Unit 27

0-10 cm:	1 secondary flake
20-25 cm:	1 secondary flake
25-30 cm:	1 secondary flake
30-35 cm:	1 secondary flake

Unit 30

0-10 cm:	2 secondary flakes

Unit 30, continued

20-25 cm:	2 retouch flakes
25-30 cm:	1 secondary flake
30-35 cm:	2 secondary flakes
35-40 cm:	1 retouch flake

Unit 33

0-10 cm:	1 secondary flake
"	1 end scraper, unifacial
10-20 cm:	1 secondary flake
20-25 cm:	1 secondary flake
25-30 cm:	1 retouch flake

Unit 36

0-10 cm:	1 secondary flake
10-20 cm:	1 secondary flake
25-30 cm:	3 secondary flakes
30-35 cm:	1 bovid tooth
"	1 bovid tooth fragment
35-40 cm:	2 retouch flakes

Unit 37

10-20 cm:	1 secondary flakes
35-40 cm:	1 retouch flake

Unit 39

0-10 cm:	1 secondary flake
"	1 retouch flake
10-20 cm:	1 retouch flake
20-25 cm:	1 secondary flake
"	1 retouch flake
25-30 cm:	1 secondary flake
"	3 retouch flakes
30-35 cm:	1 secondary flake
35-40 cm:	1 secondary flake
"	1 retouch flake
40-45 cm:	1 secondary flake
"	1 retouch flake
45-50 cm:	1 secondary flake

Unit 42

0-10 cm:	2 secondary flakes
"	1 retouch flake
10-20 cm:	1 secondary flake
20-25 cm:	1 secondary flake
"	1 retouch flake
25-30 cm:	1 secondary flake
"	2 retouch flakes
"	1 granite fragment
30-35 cm:	1 secondary flake
35-40 cm:	3 secondary flakes
"	4 retouch flakes
40-45 cm:	1 secondary flake
"	1 retouch flake
45-50 cm:	1 retouch flake

Unit 43

0-10 cm:	1 secondary flake
"	1 retouch flake
20-25 cm:	1 secondary flake
"	1 retouch flake
25-30 cm:	1 secondary flake
30-35 cm:	1 secondary flake
"	1 retouch flake
35-40 cm:	1 secondary flake

Unit 44

0-10 cm:	1 secondary flake
25-30 cm:	1 secondary flake
30-35 cm:	1 secondary flake
35-40 cm:	1 secondary flake
40-45 cm:	1 secondary flake

Figure 14, continued

Unit 44, continued
40-45 cm: 1 retouch flake
45-50 cm: 1 secondary flake

Unit 45
0-10 cm: 5 secondary flakes
10-20 cm: 2 secondary flakes
20-25 cm: 1 secondary flake
30-35 cm: 4 secondary flakes
" 2 retouch flakes
35-40 cm: 1 secondary flake
40-45 cm: 1 secondary flake
" 1 retouch flake
45-50 cm: 1 retouch flake

Unit 45B
0-10 cm: 1 secondary flake
10-20 cm: 1 secondary flake
25-30 cm: 2 secondary flakes
30-35 cm: 1 retouch flake

Unit 46
0-10 cm: 4 retouch flakes
10-20 cm: 4 secondary flakes
" 2 retouch flakes
20-25 cm: 1 retouch flake
25-30 cm: 2 secondary flakes
30-35 cm: 1 secondary flake
" 2 retouch flakes
35-40 cm: 1 secondary flake
" 2 retouch flakes
40-45 cm: 1 retouch flake
45-50 cm: 2 secondary flakes
" 1 retouch flake

Unit 46B
0-10 cm: 1 retouch flake
10-20 cm: 1 retouch flake
20-25 cm: 1 primary flake
" 2 secondary flakes
25-30 cm: 2 secondary flakes
30-35 cm: 2 secondary flakes
35-40 cm: 1 retouch flake
40-45 cm: 1 retouch flake

Unit 47
0-10 cm: 5 secondary flakes
10-20 cm: 2 secondary flakes
" 1 retouch flake
20-25 cm: 3 secondary flakes
25-30 cm: 1 secondary flake
" 4 retouch flakes
30-35 cm: 1 secondary flake
" 1 knife
" 1 body sherd
35-40 cm: 1 retouch flake
" 2 body sherds, cr
40-45 cm: 1 retouch flake

Unit 47B
0-10 cm: 2 secondary flakes
10-20 cm: 1 secondary flake
20-25 cm: 1 primary flake
25-30 cm: 1 knife
30-35 cm: 2 retouch flakes

Unit 48
0-10 cm: 3 secondary flakes
" 1 retouch flake
10-20 cm: 2 secondary flakes
" 2 retouch flakes
" 1 tool fragment

Unit 48, continued
20-25 cm: 3 retouch flakes
25-30 cm: 5 secondary flakes
" 3 retouch flakes
30-35 cm: 1 secondary flake
" 2 retouch flakes
35-40 cm: 1 secondary flake
" 1 retouch flake
40-45 cm: 1 ochre fragment

Unit 48B
0-10 cm: 1 secondary flake
" 1 retouch flake
10-20 cm: 5 retouch flakes
25-30 cm: 1 secondary flake
" 3 retouch flakes
35-40 cm: 3 retouch flakes

Unit 49
0-10 cm: 5 secondary flakes
" 1 retouch flake
" 1 body sherd
10-20 cm: 5 secondary flakes
" 2 retouch flakes
20-25 cm: 1 secondary flake
" 6 retouch flakes
25-30 cm: 2 secondary flakes
" 3 retouch flakes
30-35 cm: 1 retouch flake

Unit 50
0-10 cm: 8 secondary flakes
" 1 retouch flake
10-20 cm: 2 secondary flakes
" 2 retouch flakes
20-25 cm: 1 primary flake
25-30 cm: 2 secondary flakes

Unit 51
10-20 cm: 1 body sherd, cr
20-25 cm: 1 secondary flake
25-30 cm: 4 retouch flakes
30-35 cm: 4 secondary flakes
" 1 retouch flake
35-40 cm: 2 secondary flakes

Unit 52
0-10 cm: 1 retouch flake
10-20 cm: 1 secondary flake
" 1 retouch flake
20-25 cm: 1 secondary flake
" 1 retouch flake
" 1 abrader, broken
25-30 cm: 1 secondary flake
" 2 retouch flakes
30-35 cm: 2 secondary flakes
" 1 blade flake
" 1 retouch flake
" 1 knife
35-40 cm: 1 secondary flake

Unit 53
0-10 cm: 2 secondary flakes
10-20 cm: 1 secondary flake
" 1 ceramic crumb
20-25 cm: 2 retouch flakes
25-30 cm: 3 secondary flakes
30-35 cm: 6 secondary flakes
" 1 retouch flake
" 1 abrader, broken
35-40 cm: 2 retouch flakes

Figure 14, continued

Unit 54

0-10 cm:	5 secondary flakes
"	1 retouch flake
10-20 cm:	3 secondary flakes
"	2 retouch flakes
20-25 cm:	2 secondary flakes
"	4 body sherds, cr
"	5 ceramic crumbs
25-30 cm:	2 secondary flakes
"	2 retouch flakes
30-35 cm:	4 secondary flakes
"	4 retouch flakes
35-40 cm:	3 secondary flakes
"	1 retouch flake
40-45 cm:	1 primary flake

Unit 56

0-10 cm:	3 secondary flakes
"	1 retouch flakes
"	1 projectile point base, corner-notched
10-20 cm:	2 secondary flakes
20-25 cm:	1 core fragment
"	3 secondary flakes
"	1 retouch flake
25-30 cm:	1 secondary flake
30-35 cm:	1 secondary flake
35-40 cm:	1 secondary flake
"	1 retouch flake

Unit 58

0-10 cm:	5 secondary flakes
10-20 cm:	4 secondary flakes
"	2 retouch flakes
20-25 cm:	7 secondary flakes
"	2 retouch flakes

Unit 60

0-10 cm:	6 secondary flakes
10-20 cm:	3 secondary flakes
"	1 retouch flake
20-25 cm:	3 secondary flakes
"	5 retouch flakes
25-30 cm:	1 retouch flake

Unit 61

10-20 cm:	3 secondary flakes
20-25 cm:	3 secondary flakes
25-30 cm:	1 secondary flake
"	3 retouch flakes
30-35 cm:	1 core fragment
"	2 secondary flakes
"	2 retouch flakes

Unit 63

0-10 cm:	1 secondary flake
"	1 tool fragment
10-20 cm:	3 secondary flakes
20-25 cm:	1 secondary flake
25-30 cm:	3 secondary flakes
30-35 cm:	2 retouch flakes
"	1 ochre fragment
35-40 cm:	1 secondary flake

Unit 65

0-10 cm:	1 secondary flake
"	1 retouch flake
10-20 cm:	1 secondary flake
25-30 cm:	2 secondary flakes
30-35 cm:	2 retouch flakes
35-40 cm:	1 secondary flake
"	3 retouch flakes

Unit 67

0-10 cm:	6 secondary flakes
"	1 retouch flake
10-20 cm:	2 secondary flake
"	2 retouch flakes
20-25 cm:	2 secondary flakes
"	4 retouch flakes
25-30 cm:	6 secondary flakes
"	3 retouch flakes
30-35 cm:	3 secondary flakes
"	2 retouch flakes

Unit 69

0-10 cm:	3 secondary flakes
"	2 retouch flakes
10-20 cm:	1 retouch flake
20-25 cm:	3 secondary flakes
"	2 retouch flakes
25-30 cm:	2 secondary flakes
"	2 retouch flakes
30-35 cm:	2 retouch flakes
35-40 cm:	1 secondary flake
"	1 retouch flake

Unit 71

0-10 cm:	3 secondary flakes
10-20 cm:	4 secondary flakes
20-25 cm:	2 retouch flakes
25-30 cm:	1 secondary flake
30-35 cm:	2 retouch flakes
35-40 cm:	1 secondary flake

Unit 73

0-10 cm:	2 secondary flakes
"	1 retouch flake
10-20 cm:	5 secondary flakes
20-25 cm:	2 secondary flakes
25-30 cm:	1 primary flake
"	3 secondary flakes
"	2 retouch flakes
30-35 cm:	1 secondary flake
"	1 retouch flake
35-40 cm:	1 secondary flake
"	2 retouch flakes

Unit 74

0-10 cm:	7 secondary flakes
"	1 retouch flake
10-20 cm:	2 secondary flakes
"	1 retouch flake
20-25 cm:	2 secondary flakes
"	1 retouch flake
25-30 cm:	2 secondary flakes
"	4 retouch flakes
30-35 cm:	1 retouch flake

Unit 75

0-10 cm:	3 secondary flakes
"	1 retouch flake
10-20 cm:	1 secondary flake
20-25 cm:	1 secondary flake
"	1 retouch flake
25-30 cm:	3 secondary flakes
30-35 cm:	1 secondary flake
35-40 cm:	1 secondary flake

In Unit 36, a bovid tooth was found below the plow zone, in the middle of a concentration of small pieces of fire-cracked rock which extended into the south wall of the unit. The adjoining unit was thus opened up to see if a feature was present. Two additional 50-cm square units were laid out to the east of Units 36 and 37 and opened at the same time. Excavation of these four units revealed no feature - the rock concentration did not extend more than 3 cm into the adjoining unit - no additional faunal material, and only a few pieces of lithic debitage.

The next area excavated was near a 1-m square unit that had been opened in 1982. That unit (#1) had yielded considerable amounts of debitage, as well as a large chert knife from below the plow zone. A line of 50-cm square units was laid out parallel to the southern edge of the old excavation unit. Eventually, the excavated area was extended in all directions to follow artifact concentrations.

All together, twenty-two 50-cm square units were excavated in this area, along with four 25 x 50 cm units (#45B through #48B) that were placed between the south wall of the previous vear's Unit #1 and the new block of excavation units. Cultural materials were found below the plow zone in all of these units. Within the central excavation block, the cultural deposit extended essentially uninterrupted to 35 cm in 2 units, to 40 cm in 5 units, to 45 cm in 3 units, and to 50 cm in 2 units. The few sterile levels that were encountered did not form a consistent pattern that might indicate multiple occupations.

In the units to the north and east of the main block (#67-#71 and #56-#60), the cultural deposit did not extend to as great a depth as it did in the center portion of this excavation block. In these areas, however, the original slope of the terrace appears to have been altered by fluctuating lake levels. Thus, the level referred to during excavation as 30 cm below ground surface probably at one time corresponded to a deeper level of the cultural deposit, relative to the pre-Saylorville Lake surface of the terrace. Bearing this change in mind, the average depth of the vertical site component appears to be reasonably consistent throughout the main excavation block. Minor fluctations in artifact distribution probably resulted, for the most part, from the combined effects of cultivation and solifluction. Overall, this area showed a denser and more consistent concentration of artifacts, both horizontally and vertically, than had appeared in the other blocks of excavation units.

Ceramic sherds were found in 5 different units. Most of the sherds came from the plow zone, but a few were found just below it. All but one of the sherds were "concentrated" in an area no more than 1 meter by 2 meters in horizontal extent (see Figure 13). Unfortunately, all of the sherds recovered are from vessel bodies, and show no decoration except for cord-roughening of their surfaces.

Very few lithic tools were recovered from the excavation units in this area. The most striking items which were found are three chert knives, all of which were made from the same raw material - a distinctive blue-white chert - and all of which are very similar in form and flaking pattern. A knife of the same type had also been found in 1982, in the excavation unit just to the north of the new units. The horizontal proveniences of the four knives are indicated in Figure 13. There was not much variation in the depth at which the

knives were found: 30 to 35 cm in the 1982 unit, 33.5 cm in Unit 47, 28 cm in Unit 47B, and from 32.5 to 36 cm in Unit 52 (see Plate 7).

Edgewear analysis of these four artifacts shows that they were all used for cutting meat and bone. They are rather crude in form, and not finely finished, which suggests that they were "opportunistic" tools, manufactured quickly to meet an immediate need. It cannot be definitely stated that this site was the location at which they were manufactured, however, since virtually none of the debitage recovered during testing and excavation at 13PK259 is of the same type of chert as the finished knives. The extreme similarities of their form and flaking patterns also suggest that, if not all manufactured by the same individual, they were at least all made within a short period of time by several individuals working together.

Only three other manufactured tools were found at 13PK259. One of these is apparently a broken abrader or polisher: a piece of sandstone with one side worn flat. The other two tools are both large end scrapers with an "elongated teardrop" shape, probably designed for hafting on the narrow end. One of these shows signs of having been used for both scraping (on undetermined material) and cutting bone. The other is made of coarse-grained quartzite and does not exhibit a clear edgewear pattern. The debitage recovered from excavation units shows a relatively high proportion of retouch flakes to primary and secondary flakes. This may reflect intensive tool use at the site, which required continual resharpening of dulled edges.

The distribution of artifacts throughout the site area does not indicate that the site was any type of permanent or semi-permanent habitation. It suggests, instead, a relatively intense but very brief occupation or, perhaps, repeated short-term occupation over a long period of time. The presence of projectile points in styles covering a wide temporal span may have resulted from such continual intermittent activity at this site. The multi-componency suggested for 13PK259 by those artifacts could not be confirmed or disproved during data recovery, due to the scarcity of diagnostic artifacts in subsurface context. No organic material suitable for radiocarbon assay was found during data recovery, and the recovered ceramics are indicative of no more than a generalized Woodland cultural affiliation.

It still appears that this site served a specialized function, probably associated with food procurement. The overwhelming majority of the tools and utilized flakes that had definable edgewear patterns were used for cutting or scraping bone, with a smaller percentage of the collection having been used for cutting meat. Also, as previously noted, the site's location would have been advantageous for hunters exploiting herds of large game animals on a seasonal basis. The lack of faunal material in the excavated portions of the site may mean that part of the original terrace was truncated when Saylorville Lake flooded the mouth of Mosquito Creek. This supposition is supported by aerial photos taken in 1950 and used to prepare the 1960 Polk County Soil Survey (Soil Survey Staff:1960). Those photos appear to show a portion of the 13PK259 terrace that once extended to the east, beyond the present shoreline just upstream from the confluence of Mosquito Creek and the Des Moines River. The prehistoric hunters who used this area may have left further evidence of their activities along the bank of the creek, in an area now continually flooded by lakewaters.

13PK264

This site was initially recorded in 1976 by ISU personnel who found cultural materials on the surface of a cultivated field at the edge of the Des Moines River floodplain, at the confluence of the floodplain and a large drainage known as Mosquito Creek. The geomorphic investigations done in 1982 showed that the landform in the recorded site location was actually an accumulation of relatively recent sediments, with a buried soil appearing at a depth of about 90 cm below the crest of the landform. During resurvey and testing, no artifacts were found in primary subsurface context. However, a large concentration of sherds and bone was found along the lakeshore on the very edge of the landform. This deposit consisted mostly of grit-tempered body sherds with coarse cord markings, but did include large burned bone fragments and 4 shell-tempered sherds. Two of these sherds showed faint traces of trailed decoration, and one appears to have been a loop handle.

The presence of the shell-tempered sherds at this site suggested that it might yield information relating to the distribution of Oneota sites in the Central Des Moines River Valley. The results of the 1982 research did indicate, however, that the cultural deposit was not contained within the recent sediments. It was either within the buried soil horizons or on the floodplain, under the lake. The objectives of data recovery at this site were therefore to clarify its geomorphic position and determine if it would be possible to gain access to the actual site area for the purposes of excavation.

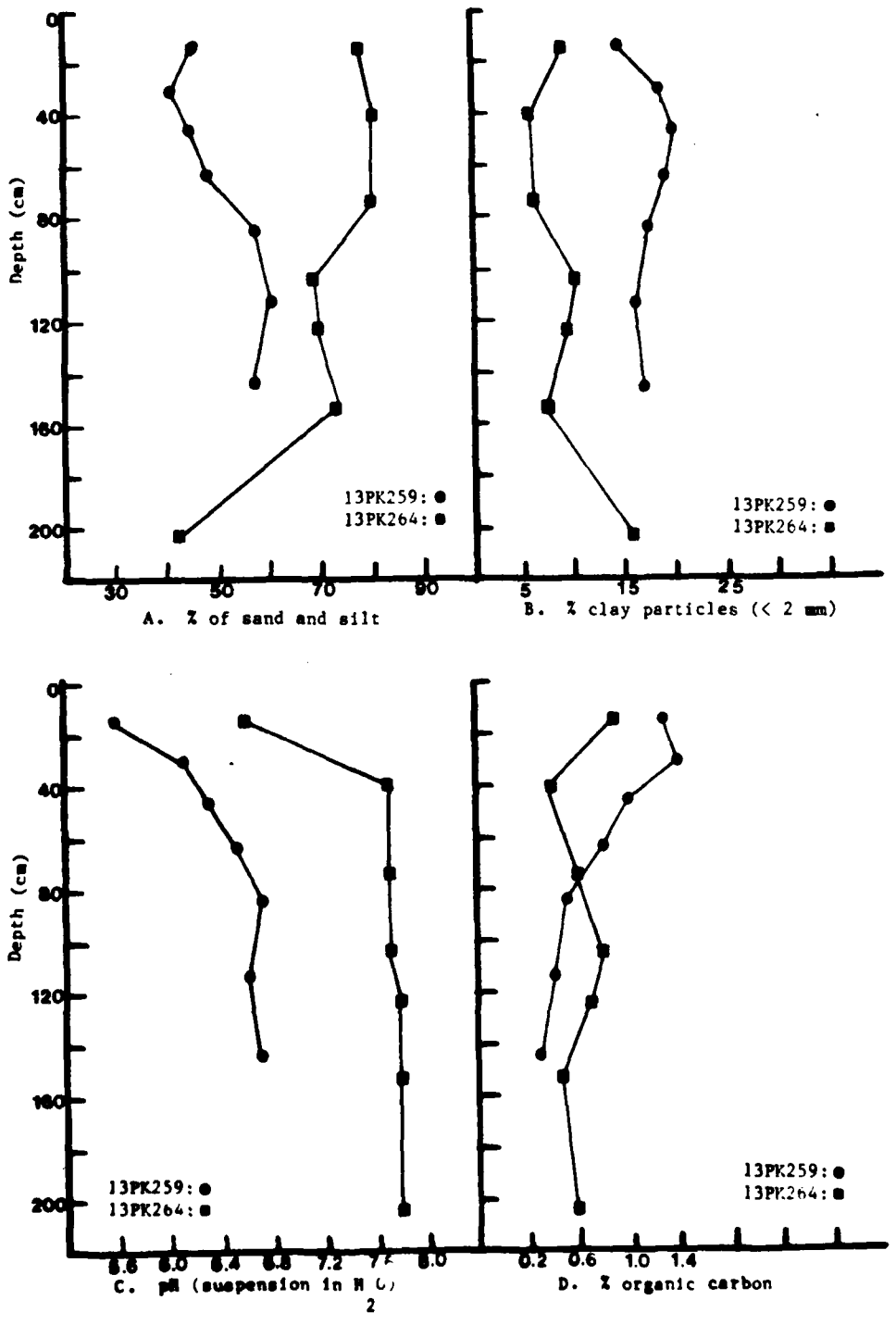
Geomorphological Description

The surface form of 13PK264 is shown in Figure 9. Landform component C6, which comprises the entire site area, is identified as a low terrace (see Plates 8 and 9). However, low-lying terraces which are subject to periodic flooding are commonly referred to as "floodplains". This is the classification given to this locality in a county soil survey that was completed before Saylorville Lake came into existence (McCracken et. al. 1960).

Analysis of soils at 13PK264 showed a thin (c. 2 cm) layer of fine sand deposited by flooding, followed by two strata of very uniform, fine sandy loam, terminating at 92 cm. These strata were underlain by an Ap horizon with a much higher clay content and appreciably more organic carbon than the higher strata (see Plate 10). The main variation in soil stratigraphy over the site area was in the depth at which the buried soil was encountered. Because the overlying sediments have a convex surface form, the buried soil was found at depths ranging from 75 to 110 cm in the midsection of the landform, and appeared very close to the surface along its northern and southern edges (see unit S2 in Figure 10). The southern edge of the site area forms a part of the shoreline of Saylorville Lake. It has apparently undergone moderate to severe erosion by wave action in a zone ranging from 5 to 10 meters wide.

Since 13PK264 and 13PK259 are located on similar landforms (both terraces), a comparison of the content of sand, clay, pH and organic carbon at various depths at the two sites was done. The results of these analyses are shown in Figure 15. The soil at 13PK259 is a moderately well-drained soil developed mostly under prairie (Aquic Hapludoll), and the soil at 13PK264 is a

Figure 15. Distribution of Soil Properties at Terrace Sites



moderately well-drained alluvial soil (Mollic Udifluvent). The soil at 13PK259 contains more the 0.6% organic carbon in the upper 70 cm. Also, the content of organic carbon below the Ap horizon decreases systematically with depth. However, in the soil at 13PK264, the content of organic carbon is less than 0.6% in the horizon below the Ap horizon. Further, the buried A (Ab) horizon which begins at about 90 cm in 13PK264 has appreciably more organic carbon than the overlying two horizons. However, these buried horizons have less carbon than the upper 3 horizons at 13PK259. The soils at both sites are not particularly acid, but the soil at 13PK264 is appreciably less acid than the one at 13PK259. The soil at 13PK259 has morphological evidence of translocated clay in B horizons in the form of clay films on ped faces. The laboratory data substantiate that these horizons have more clay than the upper two horizons. The soil at 13Pk264 has less clay in the B horizons than in the Ap horizon.

The form and soil morphology of the landform in which 13PK264 is located are appropriate to its classification (above 90 cm) as a "low terrace", according to Benn and Harris' (1982) model of landscape development: an example of terrace formation processes on-going in recent times. The weakness of soil development, in particular, attests to the youth of this particular landform. The buried soil, however, appears more likely to belong to the "intermediate terrace" category. This indicates a formation date sometime between approximately 4,000 B.P. and 1,000 B.P.

Archaeological Investigations

When fieldwork at Saylorville Lake commenced in August of 1983, the lake level had not yet receded to normal pool elevation from the heights of the early summer floods. Access to 13PK264 was restricted by extremely mucky soils and standing water along the northern and western edges of the site area. When lakewaters returned to their normal elevation and it became possible to reach the site area, the effects of the flooding were readily apparent. The shoreline (southern) edge of the terrace had been smoothed and elongated by the deposition of overbank sediments (see Figure 16). This was in contrast to the "stepped" appearance of the terrace edge, caused by wave action, during the previous field season. An inspection of the terrace surface yielded only a few artifacts, in no particular concentration (see Figure 17).

As noted previously, the objective of data recovery at 13PK264 was to examine the cultural deposit which lay beneath the "cap" of recent sediments. Figure 10 shows that the buried soil strata occur at or just below the lake level; attempts to dig into these horizons at various points around the site area were frustrated by rapid seepage of water up through the pit floors, which caused the walls to collapse before the buried soil could be reached. Numerous efforts were made to reach the buried Ap horizon with probe and shovel, none of which were successful.

The only conclusions that can be reached as a result of data recovery efforts at this site are essentially a reiteration of the conclusions formulated after resurvey and intensive testing. The actual area of primary deposition of cultural materials lies at or very close to the old lake level, either on the buried intermediate terrace or on the adjacent floodplain. The cultural materials recovered from this area are not of sufficient quantity or range to suggest anything in particular about the function or size of the

Figure 16. 13PK264 - Site Area

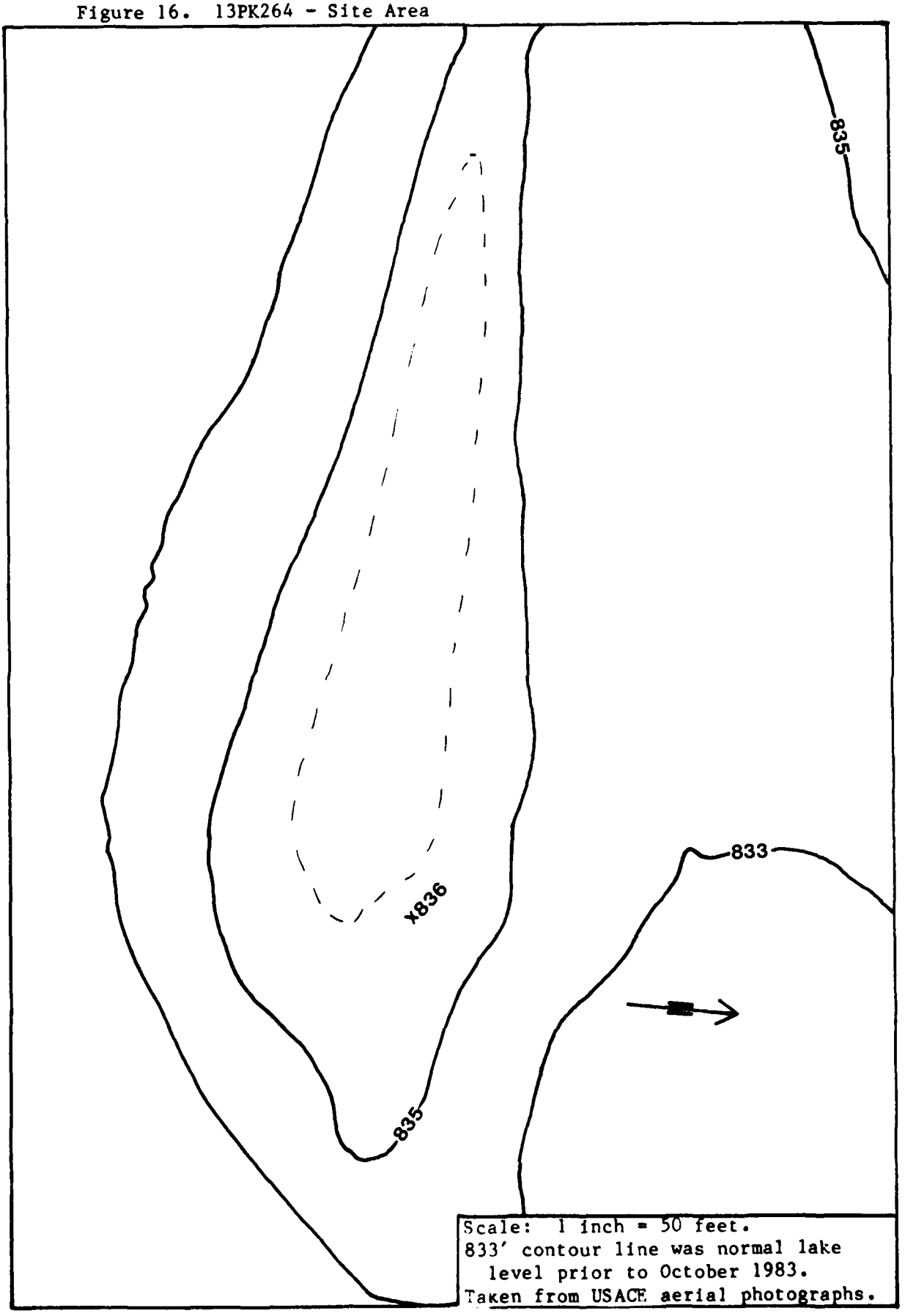


Figure 17. Material Recovered at 13PK264

Surface
1 primary flake
9 secondary flakes
1 rim sherd, cr
2 body sherds, cr
1 ceramic crumb
1 bone fragment

site. Most of the ceramics recovered in the past 2 years are grit-tempered and cord-roughened, indicating a Woodland cultural affiliation. The presence of the shell-tempered sherds must, unfortunately, remain unexplained. They may represent trade vessels, or they may reflect the presence of a multi-component site on the floodplain. Their exact significance cannot be defined.

13PK274

This site was initially recorded by ISU personnel during shoreline monitoring. The locational information on the original site form placed the site on the steep sideslope of a drainageway on the western shore of Saylorville Lake. Investigations in 1982 showed that a site was present on the alluvial fan just to the north of the confluence of this ravine and the lake. Subsurface testing at that time indicated that the cultural deposit was still partially intact, and yielded cultural materials indicative of a Middle Woodland occupation at this site. A rim sherd recovered in 1982 was identified as Havanoid, probably belonging to the type known as Havana Cord-Marked, with some possible affinity to Rowe Cord-Marked.

Since the cultural deposit did not appear to be very deep, the data recovery plan for 13PK274 focused on obtaining a broad picture of the horizontal extent of the site. Further geomorphological research was intended to clarify the position of this site relative to the series of alluvial fan formations which line the lakeshore.

Geomorphological Description

All of the sites investigated during this project which are located on alluvial fans share certain geomorphological characteristics. A general discussion of those characteristics as they appear at 13PK274 will be presented here, but it should be noted that they also apply to 13PK23, 13PK276, 13PK314 and 13PK315.

All of the fans examined during this project can be classified as "dry" alluvial fans, because the streams that supplied sediment to them are ephemeral or intermittent (Schumm 1977). These streams are also quite small, having watersheds of less than 1 km square. Each stream is now deeply incised into its associated fan, and no longer supplies sediment to that fan. The distal parts of all the fans examined have been truncated by the action of waves on Saylorville Lake.

One diagnostic property of an alluvial fan is that the apex of the fan is higher than all its other parts (Ruhe 1975). The true apexes of the fans discussed here have been eroded away by the incisement of their associated streams. The surface form of each fan was measured along one or more transects which began at a point on the highest identifiable remnant of the fan apex. Note that all transects slope downward from these points, regardless of whether the transect runs up or down the river valley. This is another feature that distinguishes alluvial fans from terraces, which all slope downstream.

The alluvial fans here are divided into two primary components. The first is the main part of the fan, which mostly has slopes of less than 6% (components C7 and C8 in Figure 18). This part begins at the lower edge of the footslope bordering the fan and extends toward the lake, toward the intermittent stream adjacent to it, and up or down the river valley, depending on its location in regard to the stream. It terminates where the slope abruptly increases. This main part can be subdivided into areas having well-drained soils, moderately well-drained soils, and wet soils. A truncated part (component C9) comprises the remainder of the fan. Slopes on this part of the

Figure 18. Landform Components at 13PK274

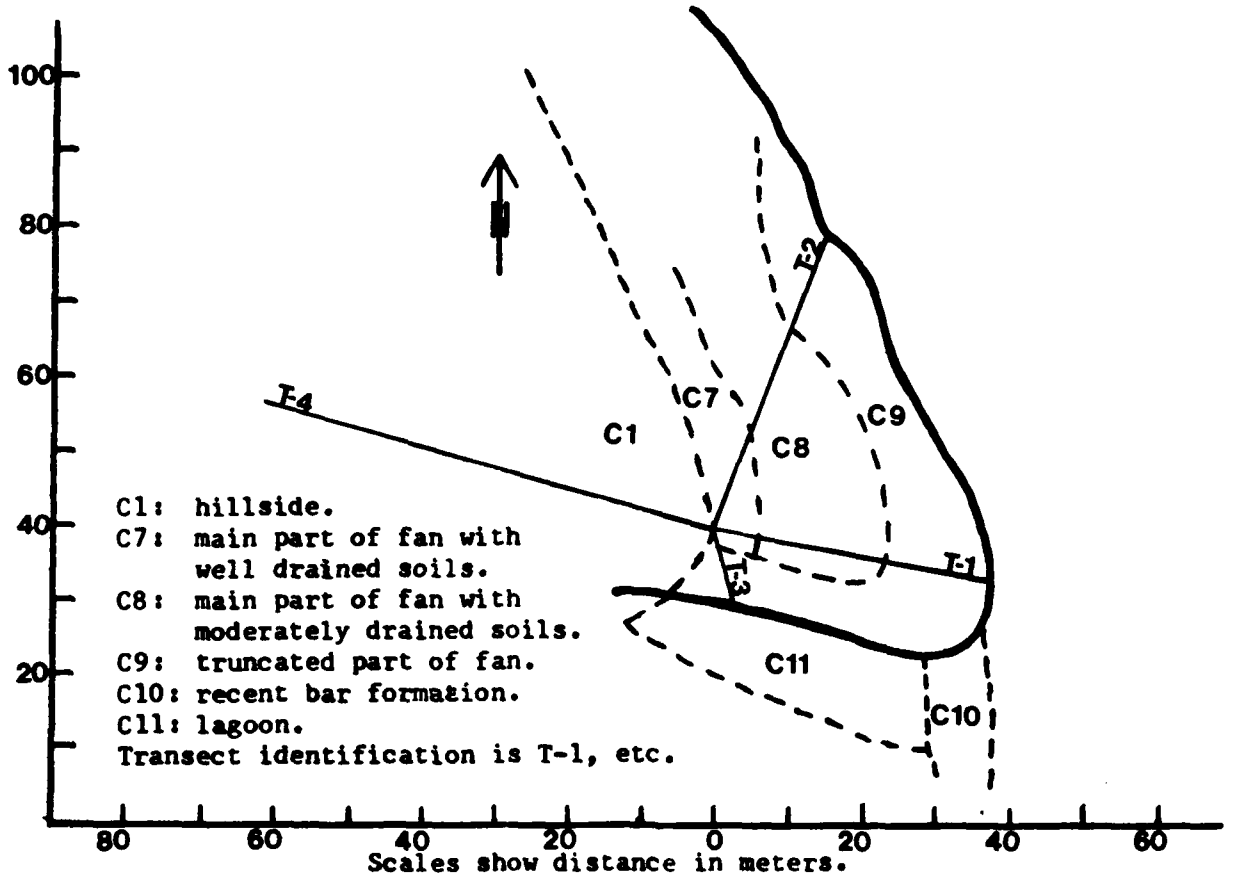
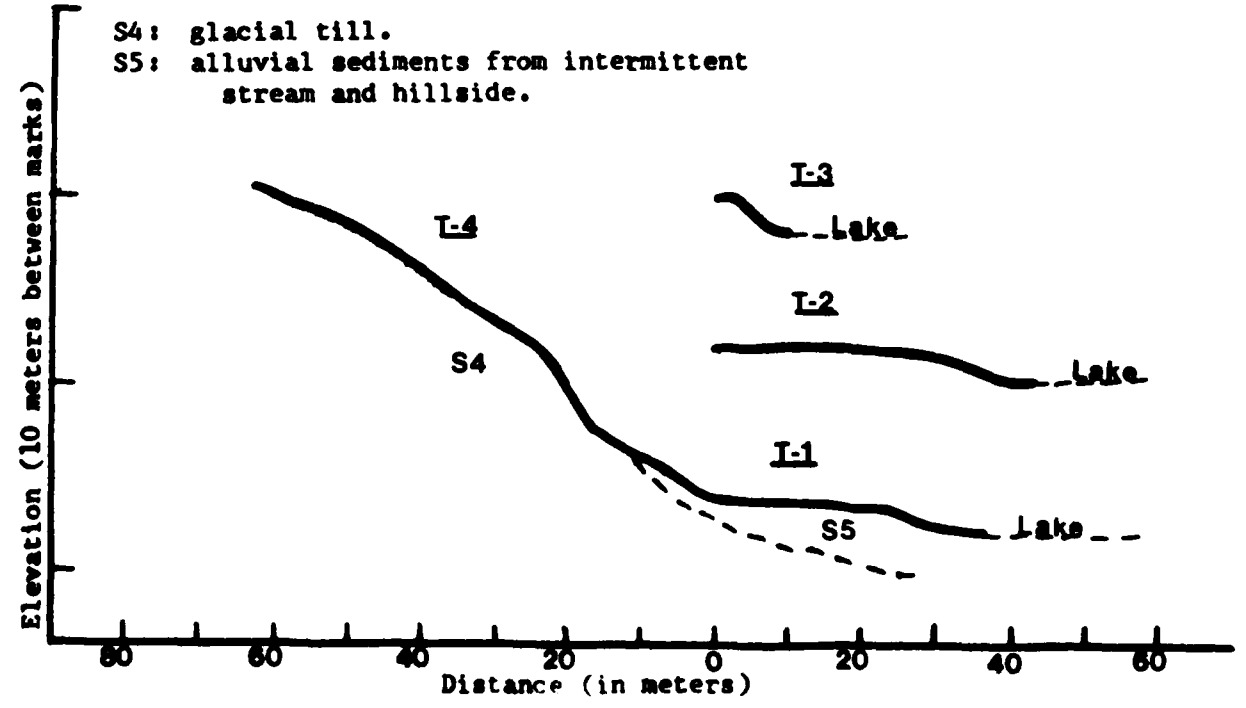


Figure 19. Stratigraphic Units at 13PK274



fan typically range from 10 to 30 percent.

The effects of erosion and deposition by Saylorville Lake are apparent at all the sites investigated. Strandlines (micro-escarpments) are present at every site. In addition, those processes have formed two distinct landforms at 13PK274: a bar (component C10) has formed across the inlet of the stream immediately to the south of the fan, and a lagoon (component C11) has formed behind the bar (see Plates 11 and 12).

A cross-section of 13PK274 is shown in Figure 19. The upper stratigraphic unit (S5) consists mostly of loamy alluvium transported there from the uplands by the associated intermittent stream. The thickness of this alluvial sediment varies from place to place, being thinnest where the fan grades into the footslope of the hillside. This sediment appears to mainly overlie glacial till (unit S4).

Soils on the main part of the fan, components C7 and C8, are similar in many properties to soils at the other fan sites. The diagnostic characteristic of these soils is that they have features associated with long-term landscape stability and forest vegetation: a comparatively thin, dark-colored A horizon, a distinct and thick E horizon from which clay has been translocated, and a thick, well-expressed brownish-colored B horizon containing much translocated clay. At 13PK274, the uppermost soil stratum (where sampled) was 6 cm of recently deposited silt loam. Beneath that, the A horizon extended to 20 cm, the E1 and E2 horizons down to 48 cm, and the Bt1, Bt2, Bt3 and Bt4 horizons to 155 cm (see Plate 13).

The soils on the main part of the fan do vary in one important property: natural soil drainage. Component C7 in Figure 18 has mostly well-drained soils (Typic Hapludalfs), and has steeper slopes than component C8, which has moderately well-drained or wetter soils (Aquollic Hapludalfs). The C8 soils have thicker A horizons than the C7 soils, and also have mottles in the upper part of the B horizon, whereas the C7 soils do not. The steeper slope of component C7 had resulted in complete erosion of the A horizon in some places.

The soils on landform component C8, the truncated part of the fan, are quite variable from site to site. In general, considerable alteration of soils has resulted from the existence of Saylorville Lake. The A and E horizons are mostly gone in this area, and the B and/or C horizons are now on the surface of the fan.

The well-developed soils found at 13PK274, as at the other fan sites, suggest considerable age for these landforms. Their initial placement (Emerson et. al. 1983) in the early stage of alluvial fan development (5,000 to 8,000 B.P.) still seems reasonable. This conclusion is also supported by examination of the surface forms of the fans. Active alluvial fans have profiles along their radii that are concave upwards like the longitudinal profile of a stream (Ruhe 1975). None of the fans examined at Saylorville Lake have such a profile. Instead, their distal parts have a distinct increase in slope, compared to their upper parts. This part with the steeper slope, the truncated part, undoubtedly was caused by a meandering and perhaps incising Des Moines River. Further, the feeder streams are incised far below the surfaces of the fans and have deposited no sediments there for some time. There is some fragmentary evidence that soils on the truncated parts of the fans were about as well-developed as soils on the main parts of the fans,

prior to the formation of Saylorville Lake. If this is true, incisement of these fans by the intermittent streams occurred in the early part of the Holocene.

Archaeological Investigations

The investigations conducted at 13PK274 in 1982 had shown that this site retained a rather shallow, but horizontally consistent cultural deposit. The ceramic artifacts recovered at that time indicated that the site was of Middle Woodland age, with a possible association with the Havana tradition of western and central Illinois.

During the quick assessment phase of work in 1983, six shovel tests were done to evaluate the effects of the spring floods on the cultural deposit (see Figure 20). Tests #1, #2 and #3 were placed along the northern boundary of the site area, and yielded moderately quantities of cultural material. Tests #4, #5 and #6 were placed along the southern edge of the site, just above the lagoon shown in Figure 18. Examination of this eroded fan edge indicated that perhaps a meter of land had been lost since the preceding field season, but that the subsurface component of the site was still in relatively good condition.

Since the total site area at 13PK274 was not very large, the focus of data recovery was on excavation of large block areas. Four 1-meter square excavation units were laid out in the approximate center of the site, between small test units that had been excavated the previous year (see Plate 14). A 50-cm square unit was also placed along the eastern (lakeward) edge of the site, because a concentration of possible fire-cracked rock was noted eroding out of the fan edge in that location. A line of granite cobbles was uncovered running diagonally through this unit (#1 in Figure 21), so two extensions (Units #1B and #1C) were added to follow the line of rock. A few more cobbles were found in the extensions, but they were not in any consistent pattern. No ash, charcoal, or other indication that this was a deliberate arrangement of rock was found.

The artifacts recovered during excavation of the four large units consisted mostly of debitage, and no evidence of any features was noted. A fragment of a sandstone abrader was found in Unit 3, between 20 and 25 cm below surface. It was later discovered that this piece fit together with another portion of abrader which had been found along the eroded southern edge of the site area.

Several items of recent vintage (bullet fragments and crockery) were found in the excavation units, in association with the prehistoric cultural materials. The exact agent by which these items were introduced into the site is not known, since this area was never under cultivation. The tree-clearing operations conducted by the Corps of Engineers may have created large root holes into which these objects fell, or they may relate to the use of the area as part of the Camp Dodge Military Reservation. Whatever the source of disturbance, it appears to have been minimal, since the soil strata at 13PK274 are for the most part intact and undisturbed.

A number of ceramic sherds were found scattered throughout the four large excavation units, but they appeared to be primarily concentrated in the northeast corner of the block excavation. Therefore, a line of 50-cm square

Figure 20. 13PK274 - Site Area

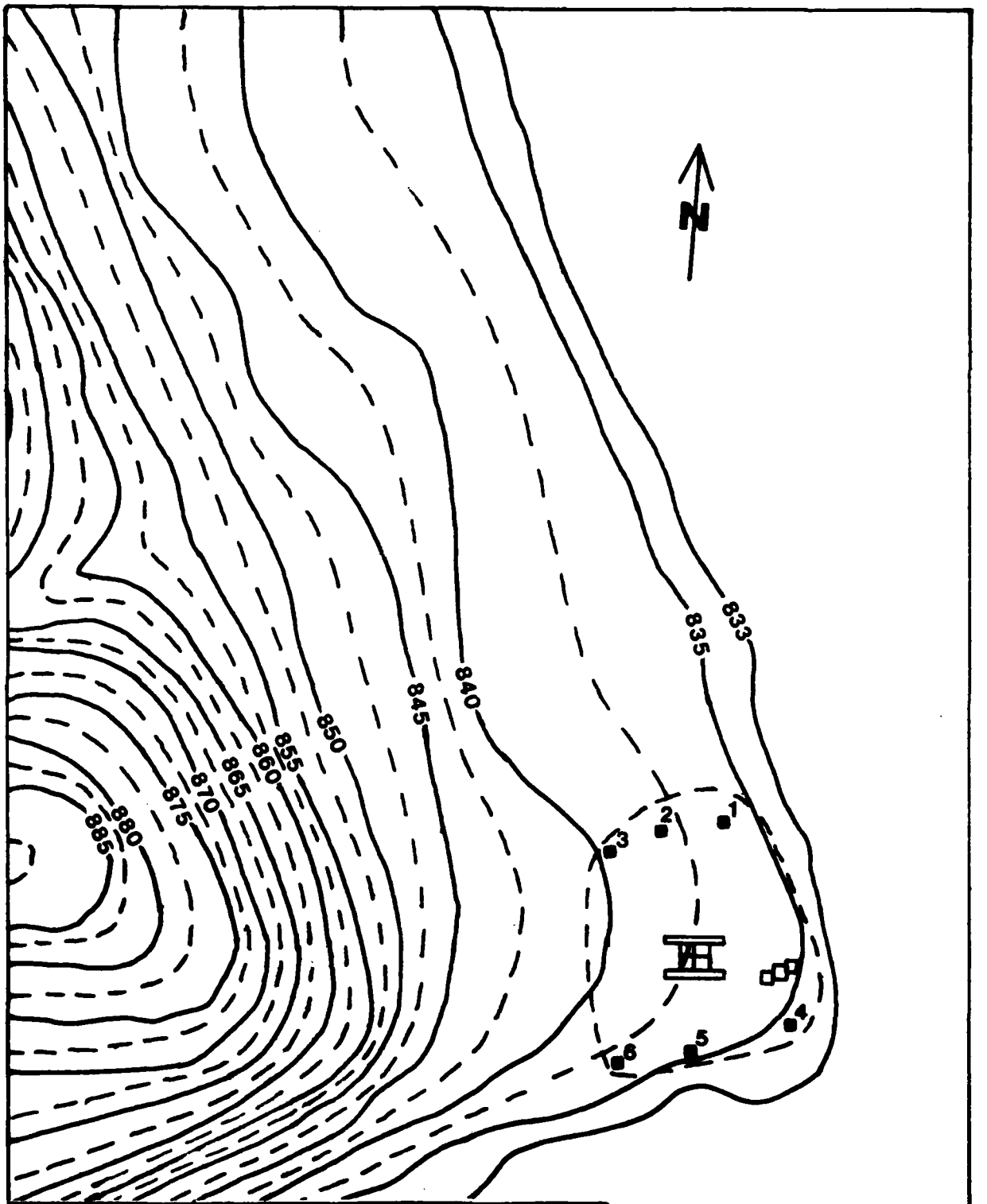
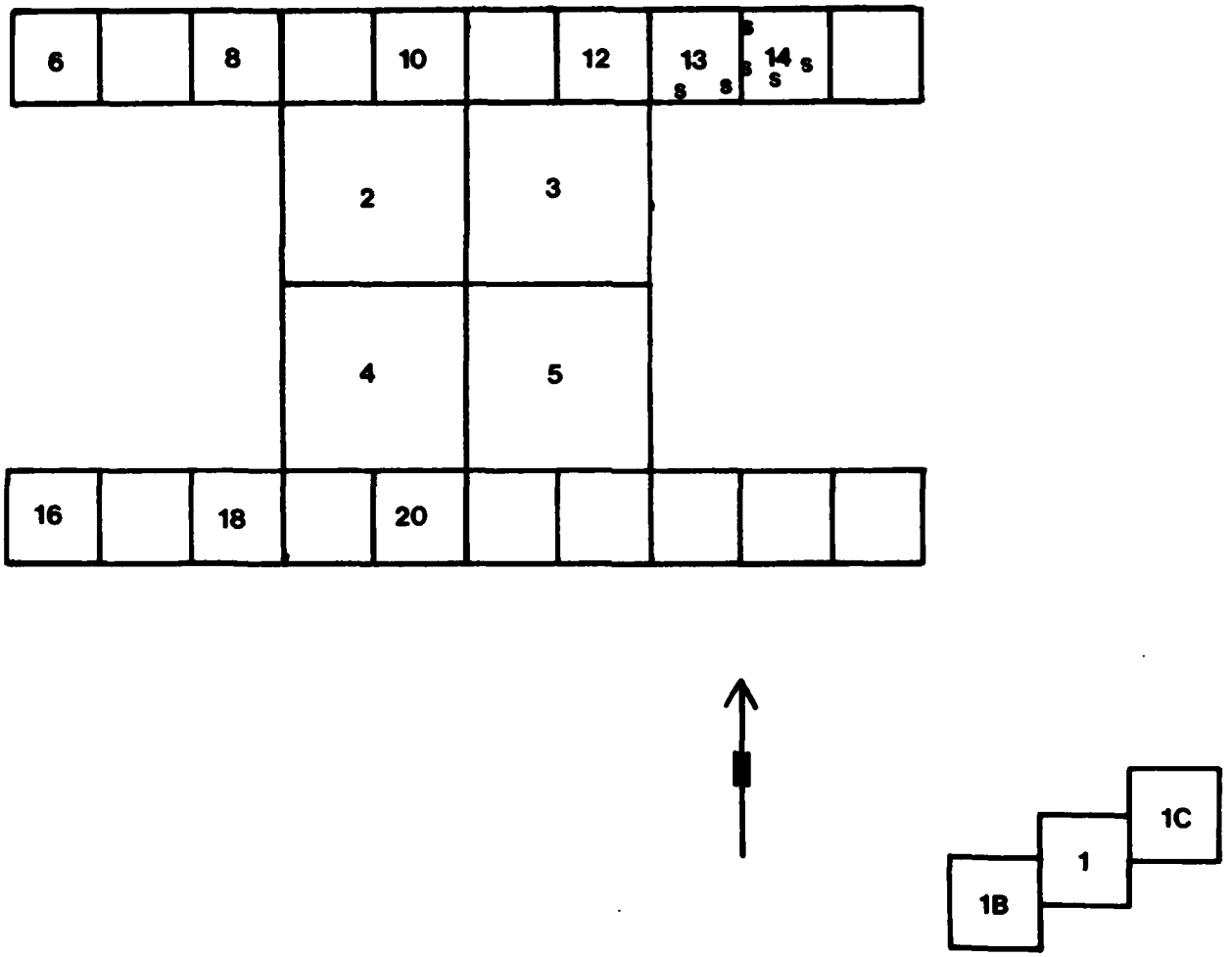


Figure 21. Excavation Units at 13PK274



units was laid out along the northern edge of the large block, to check for further ceramics. Every second unit in this line was excavated. A similar line was laid out along the southern edge of the block, and three units in this line were excavated. A concentration of large sherds was found in one of the units on the north side of the block excavation (see Figure 21), so the adjoining unit was opened. Numerous sherds were found in this unit also; several of these sherds has been reconstructed into a partial vessel body. (Several sherds recovered in 1982 from a test unit in the same vicinity were also used in the reconstruction.) The body sherds used in the reconstruction appear to be of the same type as the Havanoid rim sherd found in 1982; possibly they are from the same vessel.

The artifacts recovered from 13PK274 are listed in Figure 22. Overall, the assemblage is not particularly illuminating. The ceramics support a Middle Woodland/Havanoid cultural affiliation, but the exact function of the site cannot be determined. Edgewear analysis of the lithic materials show that most of the utilized pieces were used for cutting or scraping bone. Coupled with the presence of the ceramics, this may indicate that the excavated portion of the site was a food-preparation area, even though no evidence of a fire hearth was found. The relative shallowness of the cultural deposit suggests that this was not a long-term occupation. Also, since the portion of the fan which contains the cultural deposit is composed of moderately well-drained soils, it would have been somewhat soggy and unpleasant to occupy during the spring and summer. Because the site area undoubtedly has been truncated by erosion along its southern and eastern edges, only a part of the original living area could be investigated. Based on the data obtained, it appears that 13PK274 was a short-term, possibly fall or winter, Middle Woodland habitation.

Figure 22. Material Recovered at 13PK274

Surface

1 core
9 core fragments
5 primary flakes
44 secondary flakes
1 retouch flake
3 tool fragments
5 scrapers
2 broken abrader pieces
1 projectile point midsection

8 body sherds, cr
1 body sherd, cord-impressed
1 body sherd, trailed
1 neck sherd, incised
2 neck sherds, cr
3 rim sherds:
2 incised
1 bossed/cr

1 historic glass fragment
(reads "L. H" - "DRU" - "DES"
on three lines)

Shovel Test #1

0-10 cm: 1 secondary flake
10-20 cm: 1 secondary flake
30-40 cm: 1 tool fragment
40-50 cm: 1 secondary flake

Shovel Test #3

10-20 cm: 1 secondary flake
30-40 cm: 1 secondary flake

Shovel Test #4

0-10 cm: 1 primary flake
" 2 secondary flakes

Shovel Test #5

0-10 cm: 1 primary flake
" 3 secondary flakes
10-20 cm: 1 secondary flake
" 1 retouch flake
" 1 neck sherd, cord-impressed

Shovel Test #6

0-10 cm: 3 secondary flakes
10-20 cm: 1 secondary flake
" 1 body sherd, cr
20-30 cm: 1 secondary flake

Unit 1

0-5 cm: 1 primary flake

Unit 1B

0-5 cm: 2 secondary flakes
5-10 cm: 1 secondary flake
10-15 cm: 2 secondary flakes

Unit 1C

0-5 cm: 1 secondary flake
5-10 cm: 1 core fragment

Unit 2

5-10 cm, NW: 1 retouch flake
" SW: 1 secondary flake
10-15 cm, NW: 2 secondary flakes
" NE: 1 secondary flake
" SW: 1 secondary flake

Unit 4, continued

20-25 cm, NW: 1 primary flake
" SE: 1 groundstone tool
" " 4 secondary flakes
" SW: 1 hematite fragment
25-30 cm, NW: 2 secondary flakes
" SE: 1 body sherd, incised
" SW: 1 body sherd, cr
30-35 cm, SW: 1 secondary flake
35-40 cm, SW: 1 body sherd, incised

Unit 3

15-20 cm, NW: 1 secondary flake
" " 1 clear glass fragment
" " 1 crockery fragment
20-25 cm, NW: 3 body sherds, cr
" " 1 crockery fragment
" NE: 1 secondary flake
" SE: 1 abrader, broken
30-35 cm, NW: 2 secondary flakes
" SE: 2 bone fragments

Unit 4

0-5 cm, NW: 1 secondary flake
5-10 cm, NW: 1 secondary flake
" " 1 retouch flake
" SW: 1 ochre fragment
" " 1 secondary flake
" " 1 tool fragment
10-15 cm, NW: 2 secondary flakes
" SW: 2 secondary flakes
15-20 cm, NW: 2 secondary flakes
" NE: 1 secondary flake
" SE: 1 secondary flake
" SW: 2 secondary flakes
20-25 cm, NE: 1 petrified wood fragment
" " 1 secondary flake
" " 1 retouch flake
" SE: 1 secondary flake
25-30 cm, NE: 1 secondary flake
" SE: 1 secondary flake
" SW: 2 secondary flakes
" " 1 retouch flake
" " 1 clay frag., burned
30-35 cm, NW: 4 secondary flakes
35-40 cm, SE: 1 secondary flake

Unit 5

5-10 cm, NW: 1 retouch flake
15-20 cm, NW: 1 secondary flake
" SW: 1 secondary flakes
20-25 cm, NW: 1 secondary flake
" " 1 body sherd, cr
" SE: 1 secondary flake
" " 1 sidescraper
" " 1 drill
" SW: 1 secondary flake
25-30 cm, NW: 1 primary flake
" " 2 body sherds, cr
" NE: 1 secondary flake
" SE: 1 secondary flake
" SW: 1 ochre fragment
30-35 cm, NE: 1 secondary flake
" SW: 1 ceramic crumb
35-40 cm, NW: 1 primary flake

Unit 6

5-10 cm: 1 primary flake
10-15 cm: 1 retouch flake
15-20 cm: 1 secondary flake

Figure 22, continued

Unit 6, continued

20-25 cm:	2	secondary flakes
25-30 cm:	1	retouch flake
30-35 cm:	1	secondary flake
35-40 cm:	1	primary flake
"	1	secondary flake
40-45 cm:	1	secondary flake

Unit 8

15-20 cm:	2	secondary flakes
25-30 cm:	1	primary flake
"	2	secondary flakes
30-35 cm:	1	secondary flake
"	1	blade flake
"	2	retouch flakes
35-40 cm:	1	secondary flake

Unit 10

20-25 cm:	3	secondary flakes
25-30 cm:	1	secondary flake
35-40 cm:	1	primary flake
"	1	secondary flake

Unit 12

10-15 cm:	1	secondary flake
20-25 cm:	1	secondary flake
25-30 cm:	1	secondary flake
30-35 cm:	1	core fragment
"	1	ceramic crumb

Unit 13

5-10 cm:	1	secondary flake
"	3	ceramic crumbs
10-15 cm:	8	ceramic crumbs
15-20 cm:	1	ceramic crumb
20-25 cm:	1	secondary flake
"	1	body sherd, incised
"	5	ceramic crumbs

Unit 13, continued

25-30 cm:	1	secondary flake
"	10	body sherds, cr
"	2	ceramic crumbs
30-35 cm:	1	secondary flake
"	6	body sherds, cr
"	7	ceramic crumbs

Unit 14

20-25 cm:	4	secondary flakes
"	13	ceramic crumbs
25-30 cm:	3	secondary flakes
"	1	body sherd, incised
"	7	body sherds, cr
"	2	body sherds (e)
"	15	ceramic crumbs
30-35 cm:	2	secondary flakes
"	1	tool base
"	6	body sherds, cr
"	2	body sherds (e)
"	7	ceramic crumbs

Unit 16

5-10 cm:	1	primary flake
15-20 cm:	1	secondary flake

Unit 18

5-10 cm:	1	secondary flake
10-15 cm:	1	ochre fragment
"	1	secondary flake
20-25 cm:	1	secondary flake
30-35 cm:	1	secondary flake

Unit 20

5-10 cm:	2	ochre fragments
"	1	retouch flake
15-20 cm:	1	primary flake
"	2	secondary flakes
25-30 cm:	1	secondary flake

13PK276

This site was initially recorded by ISU personnel during monitoring of tree-clearing operations. Investigations during 1982 yielded very large numbers of lithic cores and debitage, which suggested that it may have served as a lithic workshop. The site area appeared to have been truncated along its eastern edge by cutbank slumpage, but soil stratigraphy on the fan remnant indicated that the subsurface cultural deposit had not been disrupted to any extent. Because the site lies about 10 meters above the normal lake level, it was assumed that it would be minimally affected by spring floods, and would still be in good condition when fieldwork commenced in 1983.

Geomorphological Description

This site is located on an alluvial fan, the apex of which lies about 10 meters above the normal elevation of Saylorville Lake (see Plate 15). The surface form of the site area is shown in Figure 23. Note that a considerable portion of the fan has been truncated (component C9) by erosional action. Virtually all of the soil has been removed from this component, and a large part of it just above the lake level is actually an exposure of bedrock.

Because 13PK276 is bordered on three sides by almost vertical scarps which extend to bedrock, it was possible to examine soil stratigraphy to greater depths here than at the other sites investigated (see Plate 16). The stratigraphic units identified at this site are shown in Figure 24. Unit S5, the upper-most sediment, was deeper at 13PK276 than at any other site: about 3.5 meters thick. This sediment overlies glacial till in some places, but also, in some parts of the fan, overlies an erosional surface in glacial sediments (component S6). Beneath the glacial sediments are beds of interlayered limestone, sandstone and shale.

The location for soil sampling at 13PK276 was within the C7 component of the fan (well-drained soils), about 40 meters downslope from the apex. This area lacked an A horizon (which, one assumes, was present prior to the creation of Saylorville Lake), so a sample of the A horizon from another nearby location was taken for the purposes of laboratory analysis. At the sample location, the E horizon extended from surface to 34 cm, followed by a B/E horizon to 70 cm, and horizons Bt1 through Bt4 to 170 cm, where the C horizon began (see Plate 17). As with the other alluvial fan sites, these soils exhibit characteristics of soils developed under forest vegetation and reflect a long period of stable development.

Archaeological Investigations

During resurvey and testing, 13PK276 had yielded a number of unworked cores, core fragments, numerous tools, large quantities of lithic debitage and just a few ceramic sherds from surface. It was hypothesized that this site had been used as a lithic workshop. The data recovery program focused on obtaining additional data that would bear on that question.

When 13PK276 was first visited in 1983, it was immediately apparent that our assumptions about its elevation protecting it from disruption by floodwaters were incorrect. During the summer of 1983, water in the flood control pool at Saylorville Lake had reached a height of about 875′ NGVD.

Figure 23. Landform Components at 13PK276

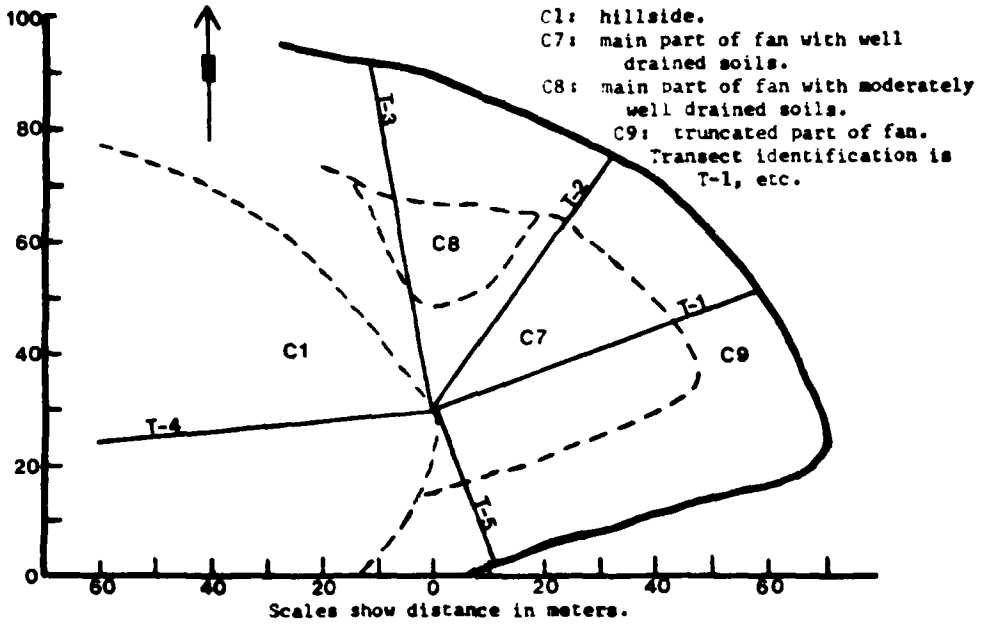
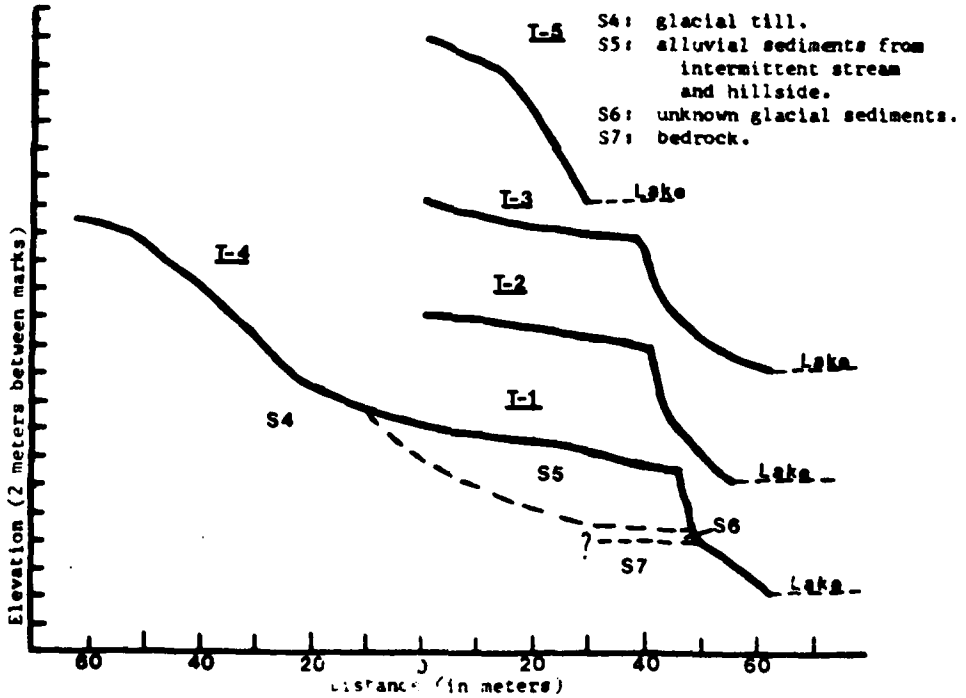


Figure 24. Stratigraphic Units at 13PK276



Trees in the site area showed watermarks some 12 to 14 feet above the ground, and most of the on-site vegetation, which had been very thick during the summer of 1982, was dead or stunted.

When the 1983 floodwaters receded, they had carried with them considerable amounts of topsoil - the entire A horizon was gone in many parts of the site. As the lake level dropped, waves hitting the steep scarp faces bordering the site had caused the cutbank to slump, especially along the eastern (lakeward) edge of the fan. Almost one meter of land appeared to have fallen away on this side of the site, carrying away several test units done in 1982. Large amounts of cultural material - core fragments, unworked cores, debitage, tools and grit-tempered body sherds - were found on the surface of the fan. These artifacts were concentrated mostly in small channels through which floodwaters had drained off the top of the fan.

During the quick assessment phase of work, shovel testing was used to evaluate the integrity of the subsurface cultural deposit (see Figure 25). Three tests were done close to the leading edge of the fan, and three additional tests were done on the northwestern side of the fan, in an area that had been closed to examination in 1982 because of extremely thick growth of brambles, to determine if the site area extended in this direction. The only evidence of prehistoric occupation recovered in this area was one flake, found at 35-40 cm in Shovel Test 5 (see Figure 26). However, this test was in an area that showed signs of having been disturbed: the surface was very uneven, soil strata were inconsistent, and a discontinuous stratum of humic gley soils appeared in shovel tests and soil probes. Although this particular fan was never under cultivation, the configuration of its northwestern portion suggested that some type of heavy machinery had been driven across it. This disruption may have been caused by the activities of the National Guard, since much of the western half of the Saylorville Project Area was previously part of the Camp Dodge Military Reservation.

Since it did not seem productive to do any further work on this disturbed part of the fan, data recovery concentrated on the southeastern part of the site area. Because of heavy tree growth, there were only a few unobstructed areas large enough for block excavation. Initially, two 1-m square excavation units were laid out side by side in the approximate center of the site area (see Figure 25 and Plate 18). These units yielded large numbers of waste flakes, consistent in distribution down to about 40 cm below surface. The only other cultural materials found in these two units were several small core fragments and a few random pieces of fire-cracked rock. (Three charred seeds found in Unit 1 were submitted to Beta Analytic, Inc. for radiocarbon assay. However, despite special pretreatment, these samples proved to be to small to yield reliable dates.)

When excavation of these units was completed, a third 1-m square unit was laid out close to the base of the footslope which forms the western border of the site. Here again, the majority of the recovered artifacts were waste flakes, although a number of body sherds were found, concentrated on the eastern side of the unit, between 5 and 35 cm. A few broken and whole tools were also recovered. In this unit, the concentration of debitage was greater than it had been in Units 1 and 2.

Overall, the collection of debitage from this site shows a very high percentage of small secondary or thinning flakes - approximately 85% of the

Figure 25. 13PK276 - Site Area

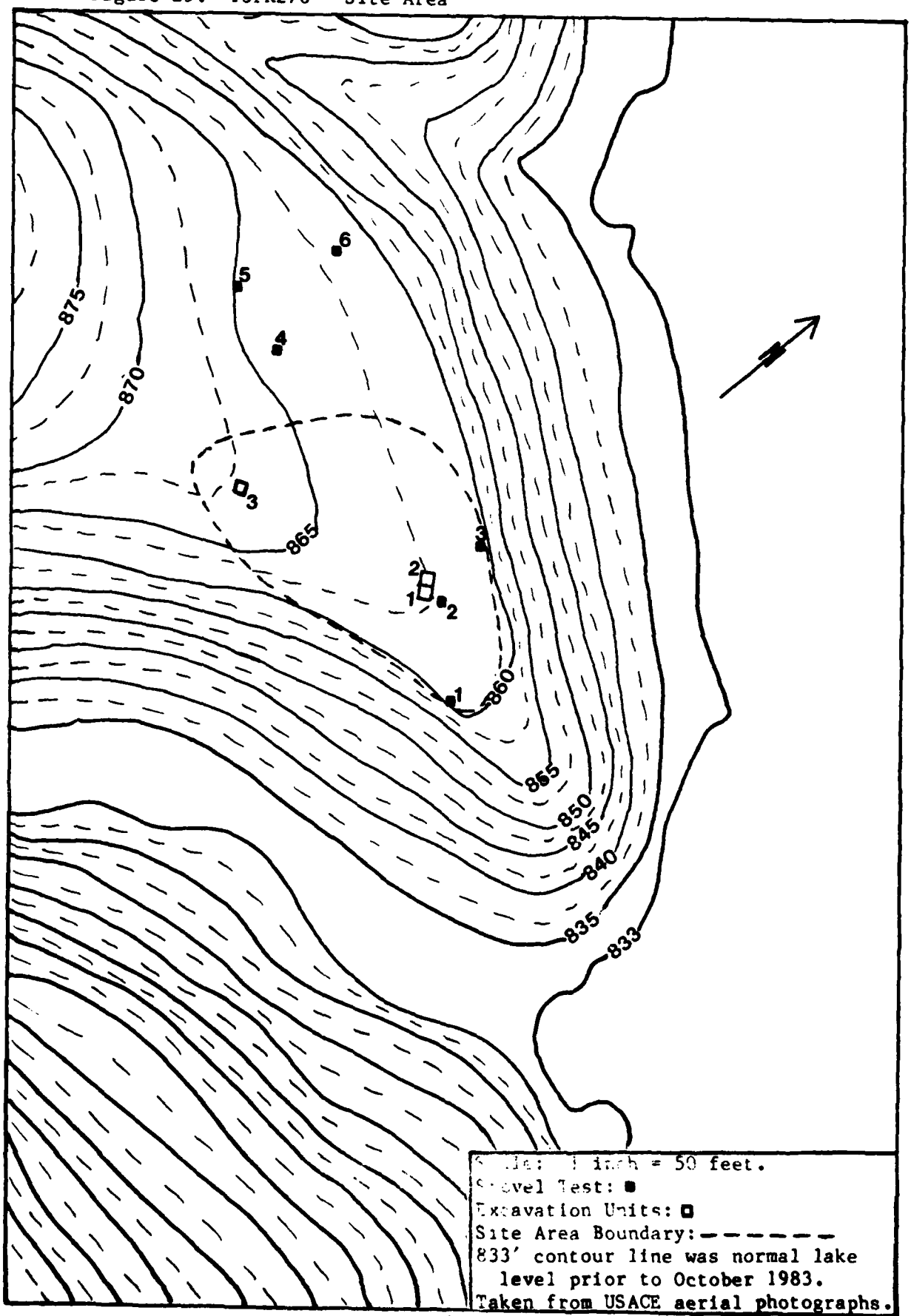


Figure 26. Material Recovered from 13PK276

Surface

3 cores
17 core fragments
31 primary flakes
227 secondary flakes
26 retouch flakes
1 blade flake
2 tool fragments
1 drill tip
1 punch/graver
1 bifacial tool
2 scrapers
2 projectile point bases
1 projectile point, side-notched
1 piece of ochre, grooved
2 body sherds, cr & cord-impressed

Shovel Test 1

0-5 cm: 2 primary flakes
" 4 secondary flakes
" 3 retouch flakes

Shovel Test 2

0-10 cm: 2 secondary flakes
" 1 ochre fragment
10-20 cm: 4 secondary flakes

Shovel Test 5

35-40 cm: 1 primary flake

Unit 1

0-5 cm, NW: 2 primary flakes
" " 14 secondary flakes
" NE: 13 secondary flakes
" " 2 retouch flakes
" SE: 10 secondary flakes
" " 3 retouch flakes
" SW: 3 primary flakes
" " 18 secondary flakes
" " 6 retouch flakes
5-10 cm, NW: 20 secondary flakes
" " 7 retouch flakes
" NE: 1 core fragment
" " 1 primary flake
" " 10 secondary flakes
" SE: 1 primary flake
" " 6 secondary flakes
" " 4 retouch flakes
5-10 cm, SW: 1 primary flake
" " 21 secondary flakes
" " 1 retouch flake
10-15 cm, NW: 1 primary flake
" " 27 secondary flakes
" " 2 retouch flakes
" NE: 1 primary flake
" " 9 secondary flakes
" SE: 4 primary flakes
" " 10 secondary flakes
" SW: 1 core fragment
" " 11 secondary flakes
" " 2 retouch flakes
15-20 cm, NW: 1 core fragment
" " 3 primary flakes
" 7 secondary flakes
" NE: 2 primary flakes
" " 13 secondary flakes
" SE: 2 core fragments
" " 1 primary flake

Unit 1, continued

15-20 cm, NE: 9 secondary flakes
" " 2 blade flakes
" SW: 7 secondary flakes
20-25 cm, NW: 12 secondary flakes
" " 1 blade flake
" NE: 2 primary flakes
" " 10 secondary flakes
" SE: 10 secondary flakes
" " 1 retouch flake
" SW: 8 secondary flakes
25-30 cm, NW: 1 primary flake
" " 2 secondary flakes
" " 5 retouch flakes
" NE: 1 primary flake
" " 5 secondary flakes
" SW: 5 secondary flakes
" " 1 retouch flake
30-35 cm, NW: 1 secondary flake
" NE: 7 secondary flakes
" SE: 1 primary flake
" " 2 secondary flakes
" SW: 2 secondary flakes
35-40 cm, NW: 8 secondary flakes
" NE: 1 secondary flake
" " 1 retouch flake
" SE: 1 retouch flake
" SW: 1 secondary flake
40-45 cm, SW: 1 secondary flake

Unit 2

0-5 cm, NW: 35 secondary flakes
" NE: 1 core fragment
" " 9 secondary flakes
" " 1 retouch flake
" SE: 5 primary flakes
" " 10 secondary flakes
" SW: 1 core fragment
" " 29 secondary flakes
" " 4 retouch flakes
5-10 cm, NW: 1 primary flake
" " 10 secondary flakes
" NE: 10 secondary flakes
" " 1 retouch flake
" SE: 3 primary flakes
" " 3 secondary flakes
" " 1 retouch flake
" SW: 9 secondary flakes
" " 1 retouch flake
10-15 cm, NW: 1 fire-cracked rock
" " 3 primary flakes
" " 17 secondary flakes
" NE: 3 primary flakes
" " 10 secondary flakes
" SE: 1 primary flake
" " 17 secondary flakes
" SW: 2 fire-cracked rocks
" " 1 core fragment
" " 24 secondary flakes
15-20 cm, NW: 5 fire-cracked rocks
" " 1 primary flake
" " 1 blade flake
" " 3 secondary flakes
" NE: 2 secondary flakes
" SE: 1 core fragment
" " 1 primary flake
" " 6 secondary flakes
" SW: 3 fire-cracked rocks
" " 1 primary flake
" " 8 secondary flakes

Figure 26, continued

Unit 2, continued

20-25 cm,	NW:	2	fire-cracked rocks
"	"	4	secondary flakes
"	NE:	1	primary flake
"	"	5	secondary flakes
"	SE:	2	primary flakes
"	"	9	secondary flakes
"	"	2	retouch flakes
"	SW:	1	primary flake
"	"	2	blade flakes
"	"	6	secondary flakes
25-30 cm,	NW:	4	secondary flakes
"	"	1	retouch flake
"	NE:	3	secondary flakes
"	SE:	3	secondary flakes
"	SW:	1	primary flake
"	"	5	secondary flakes
"	"	4	retouch flakes
30-35 cm,	NW:	1	secondary flake
"	NE:	1	secondary flake
"	SE:	2	secondary flakes
"	SW:	4	secondary flakes
35-40 cm,	NW:	2	secondary flakes
"	NE:	1	secondary flake
"	"	1	retouch flake
"	SE:	2	secondary flakes
"	SW:	2	secondary flakes

Unit 3

0-5 cm,	NW:	11	secondary flakes
"	NE:	16	secondary flakes
"	"	1	body sherd (e)
"	SE:	18	secondary flakes
"	"	5	retouch flakes
"	SW:	1	primary flake
"	"	11	secondary flakes
"	"	1	retouch flake
5-10 cm,	NW:	1	primary flake
"	"	22	secondary flakes
"	"	3	retouch flakes
"	"	1	tool fragment
"	NE:	2	primary flakes
"	"	27	secondary flakes
"	"	4	retouch flakes
"	"	1	bone fragment
"	"	2	body sherds (e)
"	"	4	ceramic crumbs
"	SE:	3	primary flakes
"	"	34	secondary flakes
"	"	7	retouch flakes
"	"	5	ceramic crumbs
"	SW:	27	secondary flakes
"	"	6	retouch flakes
"	"	1	projectile point tip
10-15 cm,	NW:	28	secondary flakes
"	"	2	retouch flakes
"	"	3	body sherds, cr
"	"	4	ceramic crumbs
"	NE:	1	core fragment
"	"	31	secondary flakes
"	"	2	retouch flakes
"	"	1	body sherd, cr
"	"	6	body sherds, (e)
10-15 cm,	NE:	7	ceramic crumb
"	SE:	36	secondary flakes
"	"	4	retouch flakes
"	"	2	body sherds (e)
"	"	5	ceramic crumbs
"	SW:	3	primary flakes
"	"	27	secondary flakes
"	"	2	retouch flakes
"	"	1	graver

Unit 3, continued

10-15 cm,	SW:	1	body sherd (e)
"	"	2	ceramic crumbs
15-20 cm,	NW:	36	secondary flakes
"	"	2	retouch flakes
"	"	4	body sherds (e)
"	NE:	1	hematite fragment
"	"	43	secondary flakes
"	"	7	retouch flakes
"	"	9	body sherds (e)
"	"	9	ceramic crumbs
"	SE:	5	primary flakes
"	"	18	secondary flakes
"	"	15	retouch flakes
"	"	1	punch/graver
"	"	7	body sherds (e)
"	"	17	ceramic crumbs
"	SW:	1	primary flake
"	"	34	secondary flakes
"	"	3	retouch flakes
20-25 cm,	NW:	1	core fragment
"	"	1	primary flake
"	"	27	secondary flakes
"	"	3	retouch flakes
"	"	1	ceramic crumb
"	NE:	17	secondary flakes
"	"	1	retouch flake
"	"	1	body sherd (e)
"	SE:	1	fire-cracked rock
"	SE:	25	secondary flakes
"	"	2	body sherds, smoot
"	"	2	ceramic crumbs
"	SW:	1	primary flake
"	"	15	secondary flakes
"	"	2	retouch flakes
25-30 cm,	NW:	1	core fragment
"	"	3	primary flakes
"	"	19	secondary flakes
"	NE:	1	primary flake
"	"	18	secondary flakes
"	"	1	ceramic crumb
"	SE:	6	secondary flakes
"	"	1	body sherd (e)
"	SW:	18	secondary flakes
"	"	4	retouch flakes
"	"	1	spokeshave
30-35 cm,	NW:	12	secondary flakes
"	"	1	retouch flake
"	NE:	6	secondary flakes
"	"	1	body sherd
"	SE:	1	primary flake
"	"	3	secondary flakes
"	SW:	10	secondary flakes
"	"	1	retouch flake
35-40 cm,	NW:	1	primary flake
"	"	7	secondary flakes
"	"	2	retouch flakes
"	NE:	5	secondary flakes
"	SE:	2	secondary flakes
"	"	1	retouch flake
"	SW:	4	secondary flakes
40-45 cm,	NW:	2	primary flakes
"	"	2	secondary flakes
"	NE:	3	secondary flakes
"	SW:	1	secondary flake

entire assemblage. The rest of the debitage is divided between very small retouch or thinning flakes (9.2%) and primary decortication flakes (5.6%). The relative proportions of these flake types vary from unit to unit and level to level within units, but the variation does not appear to be particularly significant. Flakes from a wide range of chert and flint types are present in the assemblage, some of which appear to have been struck off core fragments found on surface and in excavation units. Other materials, however, do not resemble any of the recovered cores and core fragments.

The ceramic sherds found in Unit 3 are for the most part in poor condition. Many of them are well worn on both exterior and interior, and some are partially bifurcated. They appear to have been about 0.5 cm thick originally, tempered with coarse crushed granite. Traces of heavy cord-roughening can be discerned on some of the sherds, but no other details of morphology or decoration can be identified.

The presence of ceramics at 13PK276 indicates that it does not pre-date the Woodland period. Two projectile points which were found on surface suggest an Early to Middle Woodland temporal classification, but the uncertainty of their provenience prevents a more definite assignment of cultural affiliation. The lithic assemblage includes only a few finished tools but numerous utilized flakes. Analysis of the edgewear patterns on these flakes shows that they were used to perform a variety of tasks: scraping and cutting of wood, bone and meat.

The presence of many cores and core fragments at this site suggests that tool manufacture was a major activity here. The types of debitage recovered from the excavation units indicates that the emphasis was on shaping and finishing of tools, rather than primary reduction of fresh cores. As mentioned previously, the lack of bedrock cherts in the project area would have necessitated a reliance on till cherts, which is consistent with the variety of material types observed in the collection.

Although time constraints did not permit further examination of the western portion of this site during 1983, there is a good possibility that more of the cultural deposit remains intact in that area. Part of the site area may be buried beneath slopewash from the hillside on the western border of the fan. This may be a productive location for further research, if it is pursued before cutbank slumpage destroys the remainder of the site area.

13PK314

A brief discussion of circumstances under which this site was originally recorded can be found on p. 21. As noted there, the site area, as originally defined, included the area that has now been designated 13PK23 by the Office of the State Archaeologist. This discussion will focus on the work done within the newly defined area of 13PK314.

During the resurvey and testing phases of this project, this site yielded very large quantities of ceramic sherds from the surface and eroded edges of the alluvial fan upon which it is situated. Most of those sherds were in extremely poor condition: their exterior surfaces were badly eroded, bearing little or no trace of surface treatment or decoration, and they were quite friable. A quantity of lithic debitage was also found within the site area, but very few identifiable tools were recovered.

Subsurface testing at 13PK314 showed that the cultural deposit had been truncated both horizontally and vertically by erosional processes. Data recovery was to focus on examination of the remaining cultural component, and clarification of this site's relationship to 13PK315, which lies on a remnant of the same alluvial fan upon which 13PK314 is located, on the north side of an incised drainageway.

Geomorphological Description

The investigations conducted in 1982 showed that 13PK314 and 13PK315 are located on the same alluvial fan. The stream which once supplied sediments to the fan is now deeply incised into its surface, cutting the fan into two parts. 13PK314 lies on the southern half of the fan, and is separated from 13PK315, on the northern half, by a stream channel (now a lake inlet) about 12 meters wide. The widening of this channel has destroyed most of the fan's apex. The northern edge of 13PK314 is formed by the steeply sloping bank of the stream; the rest of the site area slopes gently away from the base of the hillside on its western border towards the lakeshore to the east and an old, filled-in drainageway to the south (see Plates 19, 20 and 21).

The stratigraphy of the site area is very similar to that at the other alluvial fan sites (see Figures 27 and 28): a layer of alluvial sediments overlying glacial till. In the location at which soils were described in detail (in component C8), the uppermost soil strata were layers of post-Saylorville sediments 11 cm thick. These sediments were underlain by an A horizon to 26 cm, E1 and E2 horizons reaching to 65 cm, Bt1, Bt2 and Bt3 horizons to 155, and CB and 2C (glacial till) horizons down to 240 cm. The water table was encountered in the 2C horizon, at about 220 cm. The lower strata contained variable amounts of clean sand and silt particles, deposited as the feeder stream migrated back and forth across the fan in the constructional process (see Plates 22 and 23).

Archaeological Investigations

Because 13PK314 and 13PK315 lie on the same alluvial fan formation, the question arose after the 1982 field season as to whether or not these two sites might actually be one site which has been bisected by stream incisement. Although diagnostic artifacts had been recovered from both sites, their

Figure 27. Landform Components at 13PK314

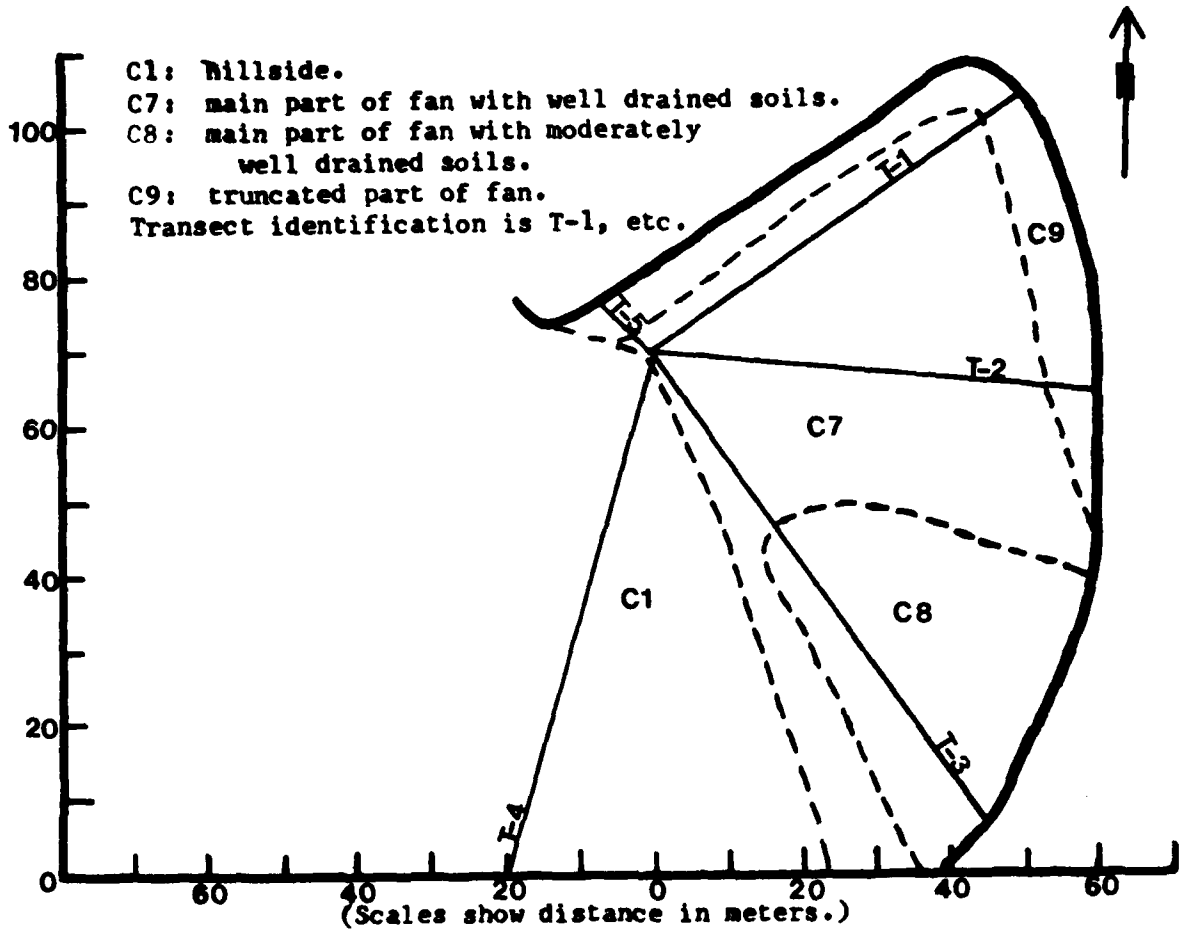
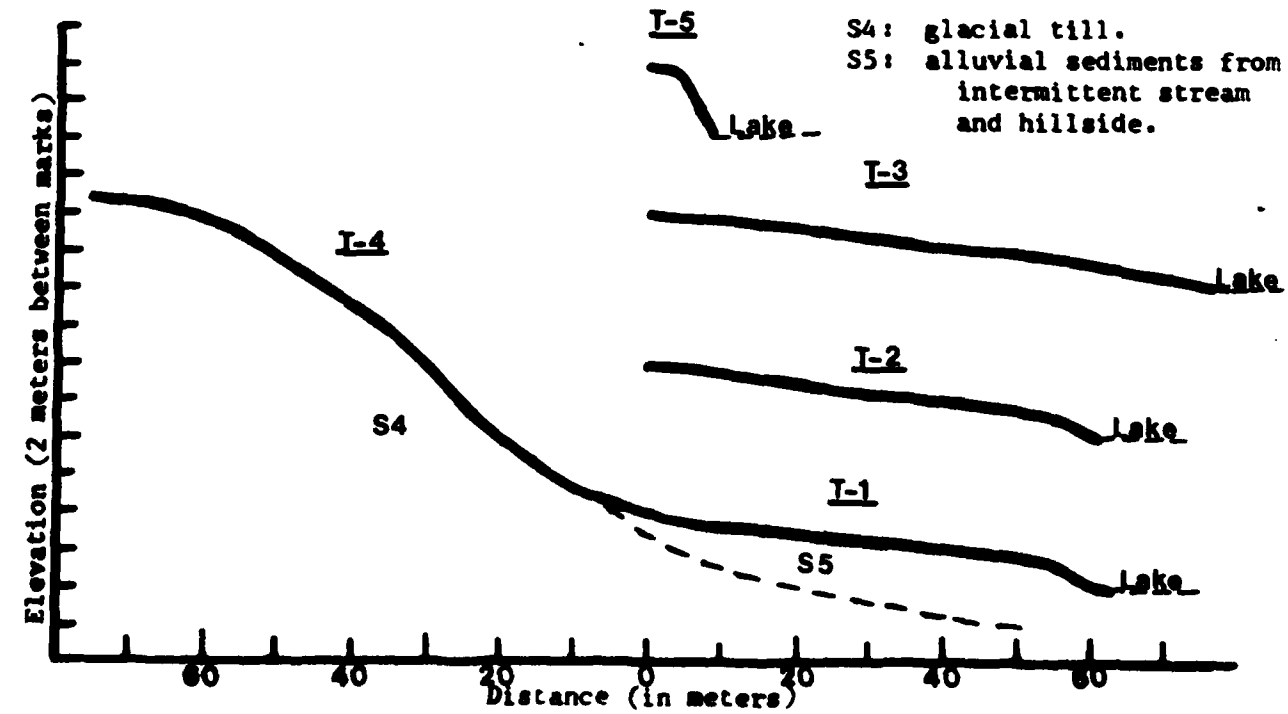


Figure 28. Stratigraphic Units at 13PK314



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relative temporal positions could not be defined with any clarity. The artifact assemblages from the two sites did not show many similarities, but it was considered possible that they represented different activity areas within one site. Data recovery at 13PK314 was therefore to include an evaluation of the potential relationship between these two sites.

During quick assessment at 13PK314, it was determined that the site area had not been seriously affected by spring floods. The eastern and northern edges of the site had suffered a little erosion, but the main part of the site had apparently been quickly covered by rising waters and was therefore protected from the effects of wave action for most of the spring and summer. A layer of sandy sediments had been deposited over the entire site by receding waters, but subsurface stratigraphy appeared to be relatively intact. Three shovel tests were done along the southern edge of the fan formation, to confirm the location of the tentative boundary on this side of the site (see Figure 29). The only artifacts recovered from these tests were found in the upper stratum of recent sediments (see Plate 24).

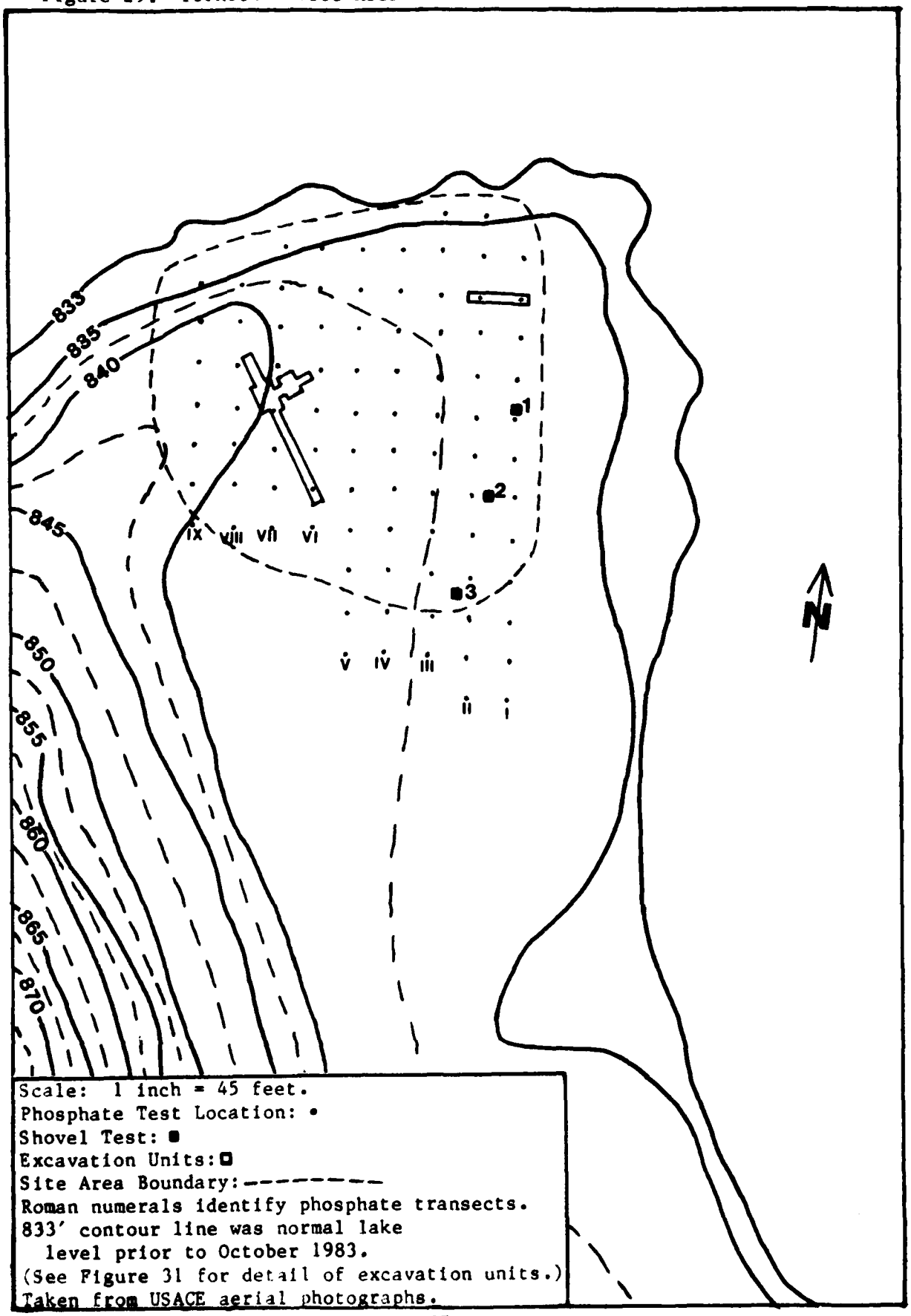
Resurvey and testing at 13PK314 had indicated that the site area was fairly large, but had not identified any significant subsurface artifact concentrations. The Scope of Work for this site therefore included a provision for the use of phosphate testing as a means of identifying productive areas for excavation. This was in the nature of an experimental process; although phosphate testing can be a valuable tool for delineating subsurface features within a site area, there are many variables which can affect its performance. Research done under the auspices of the National Reservoir Inundation Study had collected data which suggested that phosphate levels are lowered by inundation (Lenihan et al. 1981b:1-6), but it had not determined the rate or consistency of loss.

The procedures used for phosphate testing are those described in Eidt (1977). A 4-meter grid was laid out over the main portion of the site area, and a 1/4"-diameter soil probe was used to remove a soil core at each grid point. (The phosphate grid is shown in Figure 29. Transects are labelled "I" through "IX" from east to west, and grid points were designated "A", "B", "C", etc. from north to south along each transect.) Samples were taken from every 5-cm level at each grid point, starting at 5 cm below surface. During processing, individual samples were classified as "very weak", "weak", "medium", "strong" or "very strong", on the basis of speed and strength of the reaction. (Because of the possibility of phosphate loss over the entire site area, relative PO4 levels were evaluated, instead of using absolute values of phosphate content.) After all 595 samples were processed, the test results were graphed and areas of high PO4 concentration were identified.

The majority of the samples yielded very weak phosphate readings. Only a few areas showed relatively high concentrations of PO4 in comparison to the average reaction. Several of these higher readings were samples from 5-10 cm, and probably were caused by recent materials introduced by flood waters. Two strong readings were obtained from 10-15 and 15-20 cm in grid point II-C, which was used as the starting point for the first line of excavation units done at 13PK314. However, nothing was found during excavation that would explain the higher phosphate content of these strata.

Overall, the phosphate testing results were not particularly helpful in identifying features within the site area. One probe was done very close to

Figure 29. 13PK314 - Site Area



the location at which a hearth was found later in the season, but the readings from that probe did not show any higher phosphate content than the average. Perhaps this is an indication that the loss of phosphates during inundation is relative to the original P04 level; that is, areas of higher concentration have a greater absolute loss during inundation. No effort was made to compare the results from 13PK314 with phosphate levels in a non-inundated portion of the project area, since no alluvial fans with similar soils could be found that have not been flooded.

Since the results of the phosphate testing were, for the most part, non-significant, they were not used as a primary basis for placement of excavation units at this site. A line of 50-cm square units was laid out near a sample site that had high phosphate readings, and every second unit was excavated (see Figure 30), but, as mentioned above, this did not turn out to be a productive area for excavation.

The next location for excavation was chosen in a much more intuitive manner, and proved to be much more fruitful. A line of 50-cm square units was laid out in the western part of the site area, where a large rim sherd had been found on surface. Initially, every second unit in a north-south line was excavated. The units at the far southern end of the line were on the slope of the fan, and showed much more evidence of sheet erosion than the units closer to the fan apex.

The units in the center of the line (Units 13, 15, 17 and 19) yielded large numbers of ceramic sherds and rough, irregular lumps of untempered clay. Additionally, a portion of an apparent hearth was uncovered in Unit 17, appearing first just below 40 cm. The adjacent units were then opened up and excavated down to the hearth level to expose the entire feature. Additional units were laid out in all directions from the feature, following the direction of artifact concentrations (see Figure 31 for a summary of the recovered materials).

Eventually, an irregularly-shaped block totaling 5.75 m square was opened (see Plate 25). The hearth was completely exposed, and could be clearly defined in Units 16, 17, 34 and 35, extending from about 45 cm to 55 cm in depth (see Figure 32). The feature was distinguished from the surrounding soil by a color change from 10 YR 3/2-3/3 (very dark grayish brown-dark brown) outside the hearth to 2.5 YR 3/2 (dusky red) inside it, a marked increase in the number of small sherds, pieces of untempered burnt clay, and small masses of orange-red unfired clay, and by the presence of tiny charcoal flecks throughout the feature. However, no ash lenses or large pieces of organic material were found within the hearth. During excavation, the feature was pedestaled and then removed in its entirety for flotation in the lab.

A distinct concentration of ceramic sherds and pieces of untempered clay, centering around the hearth, was observed in the excavation block. (For lack of a better term, these irregular lumps of untempered, burnt clay are referred to here as "daub".) The pieces of daub are cylindrical or spherical in shape and were fired at a very low temperature. They thus do not appear to have formed a lining for the hearth, but their distribution is so clearly associated with that feature that they must be of cultural origin.

Figure 33 is a chart of the distribution of ceramic sherds and daub in

Figure 30. Excavation Units at 13PK314

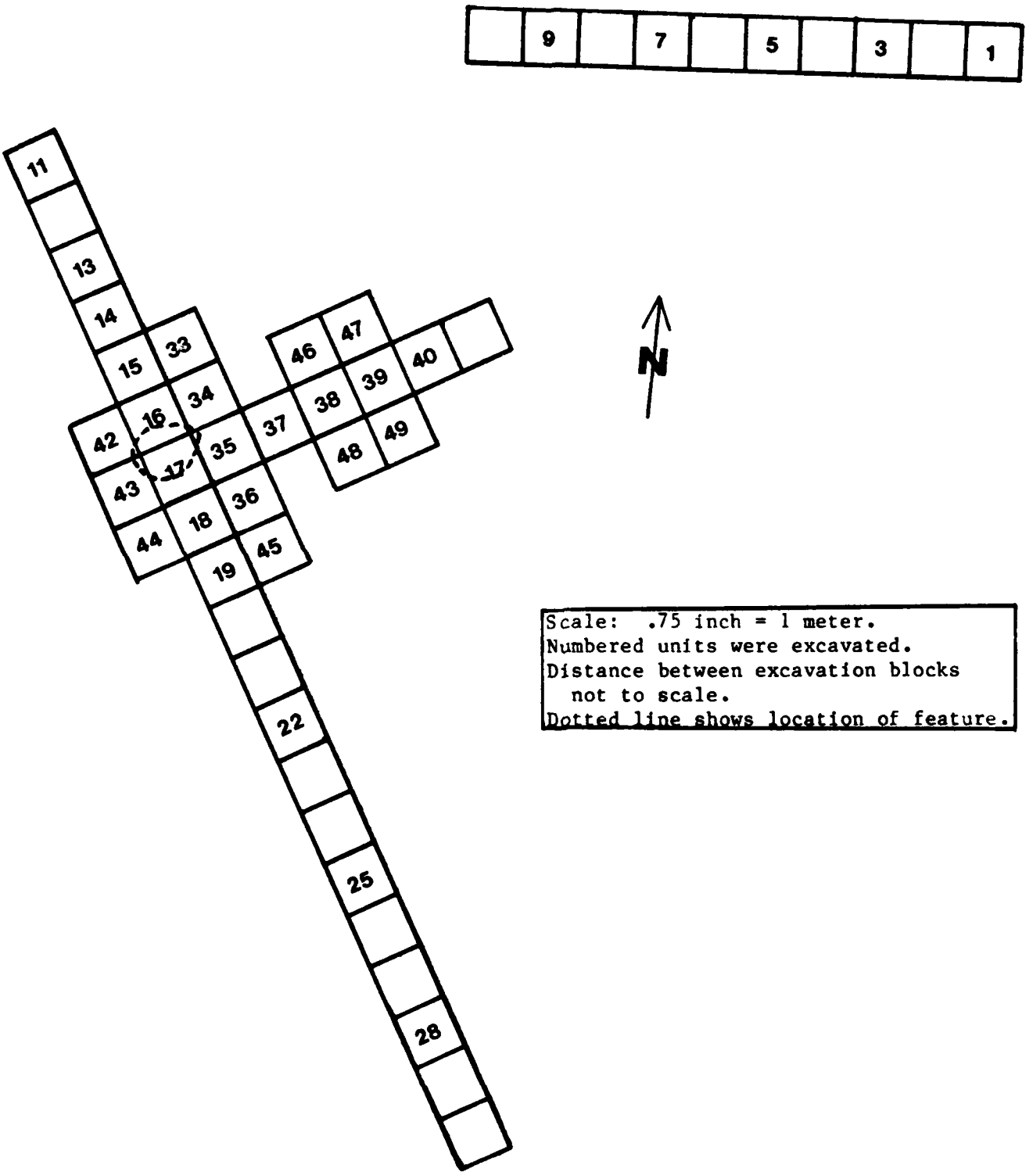


Figure 31. Material Recovered from 13PK314

Surface
- 13 core fragments
- 48 primary flakes
- 359 secondary flakes
- 17 retouch flakes
- 6 blade flakes
- 8 tool fragments
- 1 knife
- 1 drill base
- 1 grooved axe
- 3 scrapers
- 3 projectile point fragments
- 3 projectile points:
  - 1 stemmed
  - 2 corner-notched
- 95 body sherds, cr
- 3 body sherds, incised
- 200 body sherds (e)
- 74 ceramic crumbs
- 5 neck/shoulder sherds (e)
- 2 neck/shoulder sherds, cr
- 1 neck sherd, cr
- 9 rim sherds:
  - 6 cord-roughened
  - 2 eroded
  - 1 bossed/stick-impressed

Shovel Test 2
- 0-10 cm: 1 secondary flake

Shovel Test 3
- 0-10 cm: 1 body sherd, cr

Unit 3
- 0-5 cm: 1 secondary flake
- 15-20 cm: 1 body sherd, cr

Unit 7
- 0-5 cm: 1 retouch flake
- 15-20 cm: 1 secondary flake

Unit 9
- 5-10 " cm: 1 secondary flake
- " 3 body sherds (e)
- 15-20 cm: 1 body sherd, cr
- 25-30 cm: 1 secondary flake

Unit 11
- 0-5 cm: 3 retouch flakes
- 10-15 cm: 1 secondary flake

Unit 13
- 0-5 " cm: 1 retouch flake
- " 1 ceramic crumb
- 5-10 " cm: 1 primary flake
- " 1 body sherd, cr
- 10-15 cm: 1 core fragment
- 25-30 cm: 2 body sherds (e)
- 30-35 cm: 2 ceramic crumbs

Unit 14
- 0-5 " cm: 1 secondary flake
- " 1 ceramic crumb
- 10-15 " cm: 1 secondary flake
- " 2 body sherds (e)
- 15-20 " cm: 1 body sherd, cr
- " 1 ceramic crumb
- 25-30 " cm: 1 body sherd, cr
- " 2 body sherds (e)
- 30-35 " cm: 1 body sherd
- " 3 ceramic crumbs

Unit 15
- 0-5 " cm: 1 retouch flake
- " 3 body sherds (e)
- " 1 ceramic crumb
- 5-10 " cm: 3 body sherds (e)
- " 2 ceramic crumb
- 10-15 " cm: 1 retouch flake
- " 6 body sherds, cr
- 15-20 cm: 2 body sherds (e)
- 20-25 " cm: 1 primary flake
- " 1 secondary flake
- " 3 body sherds (e)
- " 1 ceramic crumb
- " 3 pieces daub*
- 25-30 " cm: 3 body sherds, cr
- " 2 ceramic crumbs
- 30-35 " cm: 1 retouch flake
- " 1 body sherd, cr
- " 1 ceramic crumb
- " 2 pieces daub
- 35-40 " cm: 1 secondary flake
- " 2 body sherds (e)
- " 1 body sherd, cr
- " 5 ceramic crumbs
- " 1 piece daub
- 40-45 " cm: 3 body sherds (e)
- " 1 ceramic crumb
- 45-50 " cm: 5 body sherds (e)
- " 1 piece daub

Unit 16
- 0-5 " cm: 3 secondary flakes
- " 1 body sherd (e)
- 5-10 " cm: 1 retouch flake
- " 1 body sherd, cr
- " 1 body sherd (e)
- " 5 ceramic crumbs
- " 4 pieces daub
- 10-15 " cm: 4 ceramic crumbs
- " 8 pieces daub
- 15-20 " cm: 1 secondary flake
- " 1 neck/shoulder sherd (e)
- " 1 body sherd, cr
- " 2 body sherds (e)
- " 5 ceramic crumbs
- " 7 pieces daub
- 20-25 " cm: 3 body sherds, cr
- " 3 body sherds (e)
- " 1 ceramic crumb
- 25-30 " cm: 2 secondary flakes
- " 2 body sherds, cr
- " 4 body sherds (e)
- " 1 piece daub
- 30-35 " cm: 1 body sherd, cr
- " 7 body sherds (e)
- " 1 ceramic crumb
- " 3 pieces daub
- 35-40 " cm: 2 secondary flakes
- " 4 body sherds, cr
- " 4 body sherds (e)
- " 2 ceramic crumbs
- " 12 pieces daub
- 40-45 " cm: 1 secondary flake
- " 1 rim sherd, cr
- " 1 body sherd (e)
- " 4 ceramic crumbs
- " 14 pieces daub
- hearth: 1 rim sherd (e)
- " 1 body sherd, cr
- " 4 body sherds (e)
- " 14 pieces daub

*"daub" here refers to irregular lumps of untempered, fired clay.

Figure 31, continued

Unit 16, continued

45-50	cm:	1 secondary flake
	"	1 body sherd, cr
	"	4 body sherds (e)
	"	1 ceramic crumb
	"	2 pieces daub

Unit 17

0-5	cm:	3 body sherds (e)
	"	1 ceramic crumb
	"	1 secondary flake
5-10	cm:	1 secondary flake
	"	1 body sherd (e)
	"	1 ceramic crumb
	"	1 piece daub
10-15	cm:	2 body sherds, cr
	"	1 ceramic crumb
15-20	cm:	4 body sherds (e)
	"	4 ceramic crumbs
	"	4 pieces daub
20-25	cm:	2 secondary flakes
	"	2 body sherds, cr
	"	4 body sherds (e)
	"	1 ceramic crumb
	"	11 pieces daub
25-30	cm:	1 secondary flake
	"	1 body sherd (e)
	"	1 ceramic crumb
	"	9 pieces daub
30-35	cm:	2 body sherds, cr
	"	1 body sherd, burned
	"	2 body sherds (e)
	"	1 ceramic crumb
	"	13 pieces daub
35-40	cm:	3 body sherds, cr
	"	8 body sherds (e)
	"	3 ceramic crumbs
40-45	cm:	3 secondary flakes
	"	1 retouch flake
	"	1 rim sherd (e)
	"	3 body sherds, cr
	"	7 body sherds (e)
	"	12 ceramic crumbs
	"	27 pieces daub

Unit 18

0-5	cm:	2 retouch flakes
	"	2 body sherds (e)
	"	2 ceramic crumbs
	"	4 pieces daub
5-10	cm:	1 secondary flake
	"	1 body sherd (e)
	"	1 ceramic crumb
	"	3 pieces daub
10-15	cm:	1 retouch flake
	"	7 body sherds, cr
	"	1 body sherd (e)
	"	2 ceramic crumbs
	"	5 pieces daub
15-20	cm:	1 secondary flake
	"	1 rim sherd, cr
	"	2 body sherds, cr
	"	2 body sherds (e)
	"	3 ceramic crumbs
20-25	cm:	1 retouch flake
	"	1 ceramic crumb
	"	1 piece daub
25-30	cm:	2 retouch flakes
	"	2 pieces daub

Unit 19

0-5	cm:	2 secondary flakes
	"	1 body sherd, cr
	"	1 body sherd (e)
	"	3 ceramic crumbs
5-10	cm:	3 secondary flakes
	"	1 body sherd (e)
	"	3 ceramic crumbs
10-15	cm:	1 rim sherd, cr
15-20	cm:	2 secondary flakes
	"	1 ceramic crumb
20-25	cm:	2 secondary flakes
	"	1 body sherd (e)
25-30	cm:	2 secondary flakes

Unit 22

0-5	cm:	2 secondary flakes
	"	1 rim sherd, cr/bossed
	"	2 body sherds (e)
	"	2 ceramic crumbs
5-10	cm:	1 retouch flake
	"	2 body sherds (e)
10-15	cm:	1 primary flake
	"	1 retouch flake
15-20	cm:	4 secondary flakes
	"	1 body sherd, cr
20-25	cm:	1 primary flake
25-30	cm:	3 secondary flakes
	"	1 body sherd, cr

Unit 25

0-5	cm:	6 secondary flakes
	"	2 retouch flakes
	"	1 rim sherd, cr/bossed
	"	1 body sherd (e)
	"	1 ceramic crumb
5-10	cm:	1 primary flake
	"	4 secondary flakes
10-15	cm:	1 core fragment
	"	4 secondary flakes
	"	1 piece daub
15-20	cm:	2 secondary flakes
20-25	cm:	2 secondary flakes
	"	1 body sherd (e)
25-30	cm:	1 retouch flake
30-35	cm:	1 retouch flake

Unit 28

0-5	cm:	1 secondary flake
	"	1 piece daub
5-10	cm:	1 secondary flake
	"	1 body sherd, cr
	"	1 ceramic crumb
10-15	cm:	2 secondary flakes
	"	1 tool fragment
15-20	cm:	2 secondary flakes
	"	2 pieces daub
20-25	cm:	1 secondary flake
	"	1 retouch flake
	"	1 body sherd, cr

Unit 33

0-5	cm:	2 secondary flakes
	"	1 retouch flakes
	"	2 body sherds (e)
	"	2 ceramic crumbs
5-10	cm:	1 primary flake
	"	3 secondary flakes
	"	1 body sherd (e)
	"	3 ceramic crumbs
15-20	cm:	2 secondary flakes
	"	2 body sherds (e)

Figure 33, continued

Unit 33, continued

20-25 cm:	2 secondary flakes
"	1 body sherd (e)
25-30 cm:	1 secondary flake
"	2 body sherds (e)
30-35 cm:	1 body sherd (e)
"	1 ceramic crumb
35-40 cm:	3 ceramic crumbs
40-45 cm:	1 core fragment
"	1 ceramic crumb

Unit 34

0-5 cm:	3 body sherds (e)
"	1 ceramic crumb
"	2 pieces daub
5-10 cm:	1 body sherd (e)
"	1 ceramic crumb
"	1 piece daub
10-15 cm:	1 secondary flake
"	3 pieces daub
15-20 cm:	1 retouch flake
"	1 body sherd (e)
20-25 cm:	1 retouch flake
25-30 cm:	1 secondary flake
30-35 cm:	1 secondary flake

Unit 35

0-5 cm:	1 secondary flake
"	2 body sherds (e)
"	2 ceramic crumbs
5-10 cm:	1 body sherd (e)
"	1 ceramic crumb
"	1 piece daub
10-15 cm:	2 secondary flakes
"	2 body sherds (e)
"	1 ceramic crumb
"	5 pieces daub
15-20 cm:	1 secondary flake
"	1 body sherd (e)
"	1 ceramic crumb
"	2 pieces daub
20-25 cm:	1 secondary flakes
"	1 body sherd (e)
"	2 ceramic crumbs
"	1 piece daub
25-30 cm:	2 retouch flake
"	1 ceramic crumb
30-35 cm:	1 secondary flake
35-40 cm:	1 secondary flake
40-45 cm:	1 body sherd (e)
"	1 piece daub

Unit 36

0-5 cm:	1 secondary flake
"	2 body sherds (e)
"	3 ceramic crumbs
5-10 cm:	1 core fragment
"	1 body sherd, cr
10-15 cm:	1 core fragment
"	1 body sherd, cr
"	1 body sherd (e)
"	2 pieces daub
15-20 cm:	1 secondary flake
"	1 neck/shoulder sherd, cr
"	1 ceramic crumb
"	3 pieces daub
20-25 cm:	1 ceramic crumb
"	4 pieces daub
25-30 cm:	2 pieces daub
30-35 cm:	2 secondary flakes

Unit 37

5-10 cm:	1 primary flake
"	1 secondary flake
10-15 cm:	1 secondary flake
"	1 piece daub
15-20 cm:	1 rim sherd, cr/bosse
"	1 body sherd, cr
"	1 ceramic crumb
20-25 cm:	3 secondary flakes
25-30 cm:	1 body sherd, cr
"	1 piece daub
30-35 cm:	1 secondary flake
"	1 piece daub
35-40 cm:	1 piece daub

Unit 38

0-5 cm:	1 body sherd, cr
5-10 cm:	1 neck/shoulder sherd,cr
10-15 cm:	1 retouch flake
15-20 cm:	1 secondary flake
25-30 cm:	1 projectile point, corner-notched
"	1 ochre fragment

Unit 39

d 0-5 cm:	1 secondary flake
"	1 body sherd (e)
"	1 ceramic crumb
10-15 cm:	1 body sherd (e)
"	1 ceramic crumb
"	1 piece daub
15-20 cm:	1 ochre fragment

Unit 40

0-5 cm:	1 retouch flake
"	1 body sherd (e)
10-15 cm:	1 ceramic vessel base, subconoidal, cr

Unit 42

0-5 cm:	1 primary flake
"	1 secondary flake
"	1 body sherd, cr
"	1 body sherd (e)
"	1 piece daub
5-10 cm:	1 body sherd (e)
"	1 ceramic crumb
10-15 cm:	1 secondary flake
"	1 body sherd, cr
"	1 ceramic crumb
"	3 pieces daub
15-20 cm:	2 body sherds, cr
"	6 pieces daub
20-25 cm:	1 secondary flake
"	1 body sherd, cr
"	2 ceramic crumbs
"	6 pieces daub
25-30 cm:	1 secondary flake
"	1 ochre fragment
"	2 body sherds (e)
"	2 ceramic crumbs
"	13 pieces daub
30-35 cm:	1 body sherd (e)
"	14 pieces daub
35-40 cm:	1 body sherd, cr
"	3 ceramic crumbs
40-45 cm:	1 retouch flake
"	2 body sherds (e)
"	13 pieces daub

Figure 33, continued

Unit 43

0-5 cm:	1 body sherd,cr
"	2 body sherds (e)
"	3 ceramic crumbs
"	4 pieces daub
5-10 cm:	1 secondary flake
"	1 body sherd (e)
"	1 ceramic crumb
"	1 piece daub
15-20 cm:	2 body sherds (e)
"	1 ceramic crumb
"	2 pieces daub
20-25 cm:	1 body sherd (e)
25-30 cm:	1 body sherd, cr
"	1 ceramic crumb
"	2 pieces daub
"	2 ceramic crumbs
"	4 pieces daub
35-40 cm:	1 body sherd (e)
"	6 pieces daub
40-45 cm:	1 body sherd (e)
"	6 pieces daub

Unit 44

0-5 cm:	1 secondary flake
"	1 body sherd, cr
"	4 ceramic crumbs
"	1 piece daub
5-10 cm:	2 secondary flakes
"	1 retouch flake
"	1 rim sherd, cr
"	1 body sherd, cr
"	1 body sherd (e)
"	1 piece daub
10-15 cm:	1 secondary flake
"	1 neck sherd, cr
"	4 body sherds, cr
"	2 ceramic crumbs
15-20 cm:	1 primary flake
"	1 body sherd
"	1 piece daub
20-25 cm:	2 ochre fragments
25-30 cm:	2 secondary flakes
"	1 piece daub
30-35 cm:	1 secondary flake
"	1 ceramic crumb

Unit 45

0-5 cm:	1 core fragment
"	2 secondary flakes
"	1 retouch flake
"	1 body sherd (e)
"	1 ceramic crumb
5-10 cm:	1 secondary flake
"	3 ceramic crumbs
"	2 pieces daub
10-15 cm:	2 body sherds (e)
"	1 ceramic crumb
15-20 cm:	2 primary flakes
"	3 secondary flakes
"	1 body sherd, cr
"	1 body sherd (e)
20-25 cm:	2 secondary flakes
"	1 retouch flake
"	1 body sherd (e)
"	1 ceramic crumb
25-30 cm:	2 secondary flakes
"	1 retouch flake

Unit 46

0-5 cm:	1 body sherd, cr
10-15 cm:	1 secondary flake
"	1 body sherd, cr
"	1 body sherd, burned
15-20 cm:	2 body sherds (e)
"	1 secondary flake

Unit 47

0-5 cm:	3 secondary flakes
5-10 cm:	1 retouch flake
"	1 body sherd (e)
15-20 cm:	1 body sherd, incised

Unit 48

0-5 cm:	2 secondary flakes
5-10 cm:	1 primary flake
"	2 body sherds (e)
10-15 cm:	1 body sherd, cr
15-20 cm:	1 secondary flake
"	2 ceramic crumbs
20-25 cm:	1 core fragment
"	1 secondary flake
"	1 rim sherd, cr/incised/ bossed
30-35 cm:	1 secondary flake

Unit 49

0-5 cm:	3 secondary flakes
"	1 piece daub
15-20 cm:	1 ceramic crumb

Figure 32. Detail of Feature at 13PK314

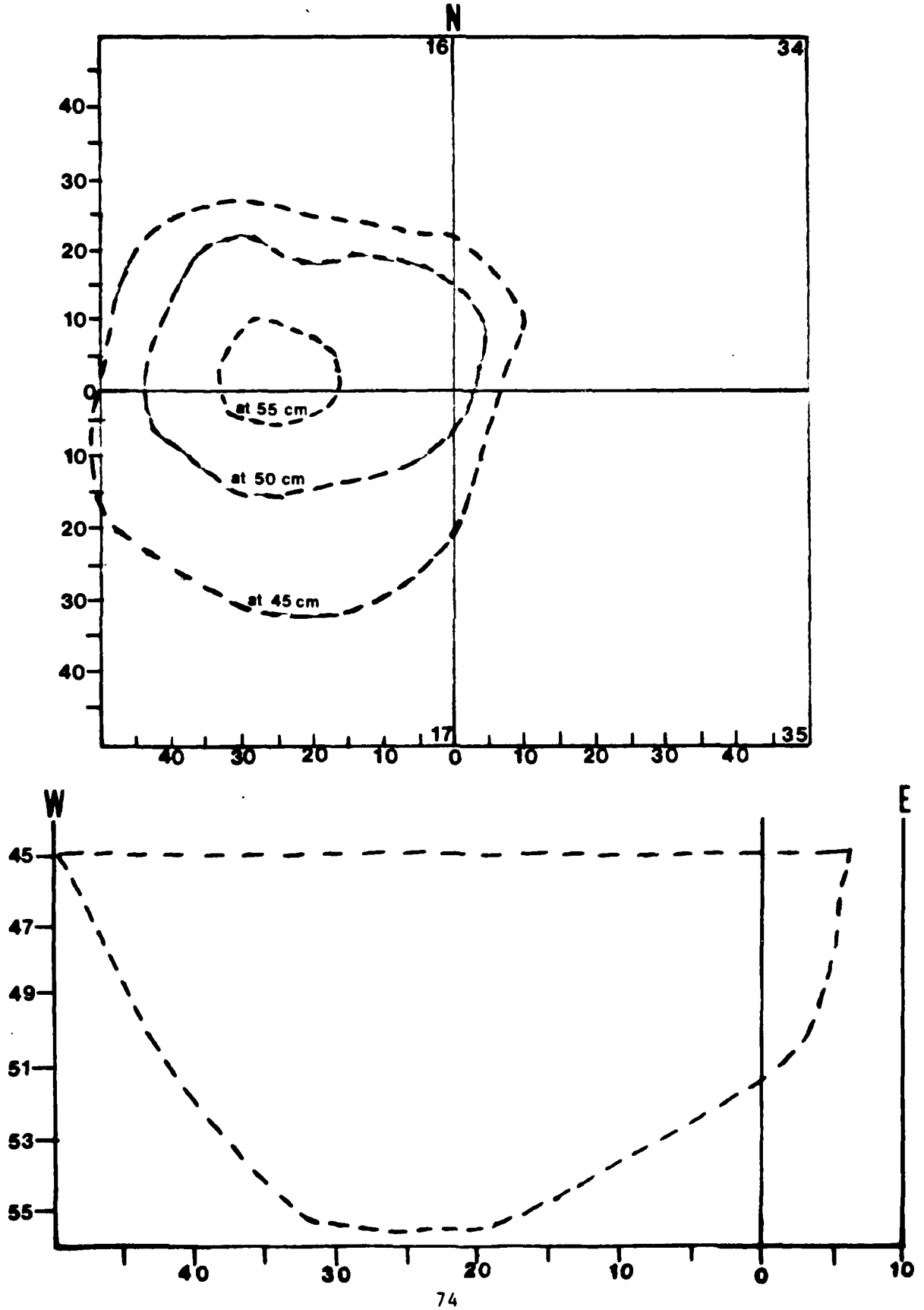


Figure 33. Distribution of Ceramics at 13PK314

Distribution of Sherds (in grams)

Unit: / Depth	15	16	17	18	33	34	35	42	43	44
0-5 cm	11.1	7.8	16.5	8.8	9.8	11.8	7.2	14.1	19.0	5.3
5-10 cm	11.7	19.1	10.6	1.4	2.4	1.8	11.6	4.1	3.7	23.0
10-15 cm	12.1	-	15.8	76.8	-	7.4	8.0	3.8	-	23.2
15-20 cm	3.1	25.1	25.4	19.6	4.4	1.1	2.9	5.5	13.4	3.4
20-25 cm	22.2	71.8	23.9	-	2.2	-	2.0	6.5	2.2	-
25-30 cm	21.9	68.2	2.6	-	6.2	-	-	13.9	11.2	-
30-35 cm	10.7	39.3	44.7	-	14.5	-	-	7.9	1.3	0.6
35-40 cm	16.4	146.2	143.9	-	1.4	-	-	9.3	2.0	-
40-45 cm	94.4	57.1	81.9	-	-	-	6.3	11.0	3.4	-
45-50 cm	30.4	45.2	-	-	-	-	-	-	-	-

Distribution of Daub (in grams)

Unit: / Depth	15	16	16 (h)	17	17 (h)	18	33	34	34 (h)	35	42	43	44
0-5	-	-	-	-	-	7.9	-	19.2	-	-	3.0	4.9	1.2
5-10	-	4.1	-	0.7	-	4.2	-	1.1	-	3.0	-	5.0	2.5
10-15	-	15.8	-	-	-	33.6	-	4.2	-	10.2	7.5	-	0.5
15-20	-	9.8	-	3.4	-	-	-	2.4	-	17.5	10.7	10.4	0.8
20-25	1.6	-	-	31.3	-	1.9	-	-	-	0.4	4.0	-	-
25-30	-	9.7	-	10.4	-	1.9	-	-	-	-	3.7	12.7	0.3
30-35	14.5	10.6	-	19.5	-	-	-	-	-	-	7.6	7.2	-
35-40	2.9	17.8	-	51.2	-	-	-	-	16.9	-	-	9.8	-
40-45	-	48.0	-	37.6	-	-	-	1.2	-	-	8.3	15.8	-
40-45	-	-	-	-	20.5	-	-	-	-	-	-	-	-
45-50	0.8	7.5	-	-	20.7	-	-	-	-	-	-	-	-
45-53	-	-	10.5	-	-	-	-	-	-	-	-	-	-
53-55	-	-	0.2	-	-	-	-	-	-	-	-	-	-

the excavation units surrounding the hearth. Because the size of the sherds and the pieces of daub varied widely, concentrations are expressed in terms of the weight in grams of finished ceramics and daub found in each level of each unit.

The densest concentrations of sherds appeared in Units 15, 16, 17, 42 and 43, to the north, south and west of the hearth. The concentrations increased at the level just above where the feature first became recognizable, and continued to a depth of 50 cm, just above the bottom of the feature. Many of the sherds found between 30 and 40 cm, especially in Units 16 and 17 (at the approximate top of the hearth), appear very charred on their interior surfaces, but not their exteriors.

The distribution of daub was more dispersed throughout the excavation block, but still exhibits a close association with the ceramic concentrations. It appears in greatest quantity in the units immediately adjacent to the feature, and was concentrated to a lesser degree in the units to the west and southeast of the hearth, especially at a depth of 20 cm. A quantity of small pieces of daub was found inside the hearth itself, down to the bottom of the feature.

Another, possibly related, "feature" was uncovered to the south of the hearth. A layer of granite cobbles was found between 25 and 30 cm, concentrated in the the southeastern corner of Unit 18, the eastern half of Unit 19, the southwestern corner of Unit 36 and the northwestern corner of Unit 45. The rocks formed a relatively flat, continuous layer which bottomed out between 29 and 31 cm. Most of the cobbles were friable, showed angular fracture patterns, and appeared to have been subjected to heat. Only a few other pieces of rock were found in the rest of the excavation block.

The distribution of artifacts in the vicinity of the hearth quite obviously shows that this was a center of activity during the occupation of this site. The hearth may have served several functions, being used for food-preparation and also, possibly, as a pottery-making center. This activity is suggested by the presence of the lumps of untempered clay, the large number of sherds in and around the hearth, and the sherds that are charred only on their interiors. These might have been used to cover vessels during firing, to create a reduction atmosphere.

Other artifactual materials recovered at 13PK314 include several whole or broken projectile points, scrapers, blade flakes and fragments of other tools. A small half-grooved axe made of hematite was found in the water at the edge of the lake, on the eastern boundary of the site area. Analysis of the edgewear patterns on tools and utilized flakes showed that most of the blades and utilized flakes were used for cutting bone. The scrapers showed wear patterns that were unidentifiable because of use on several different materials.

Only three of the projectile points recovered from surface at 13PK314 were intact. One of these was stemmed and the others were corner-notched. An additional corner-notched point was found between 25 and 30 cm in Unit 30, and the base of a small side-notched point was found on surface. In general form, these artifacts most closely resemble points of the Archaic and Early Woodland periods.

The ceramics recovered at 13PK314 include numerous eroded body sherds and various rim, neck and shoulder sherds. Overall, the ceramics are similar in morphology to Havana/Cedar Ware, although decoration differs from the decorative motifs common to these wares. They probably represent local variants within a generalized Havana-Hopewell ceramic tradition. This would place the occupation of this site sometime during the Middle Woodland period.

13PK315

This site was originally recorded in 1980 by shoreline monitors from ISU. In 1982, testing at 13PK315 showed that the site area had been truncated on two sides by an incising stream, and had suffered considerable topsoil erosion during high-water episodes. The cultural deposit was found to be shallow and rather constricted in size. Artifacts recovered during resurvey and testing included a high percentage of projectile points, scrapers and other tools, most of which were found on surface. The form of the projectile points suggested that this site dated from the Early or early Middle Woodland period. Because of the site's position relative to 13PK314, one objective of data recovery was to examine the possibility that the two sites were actually separate portions of one large occupation area.

Geomorphological Description

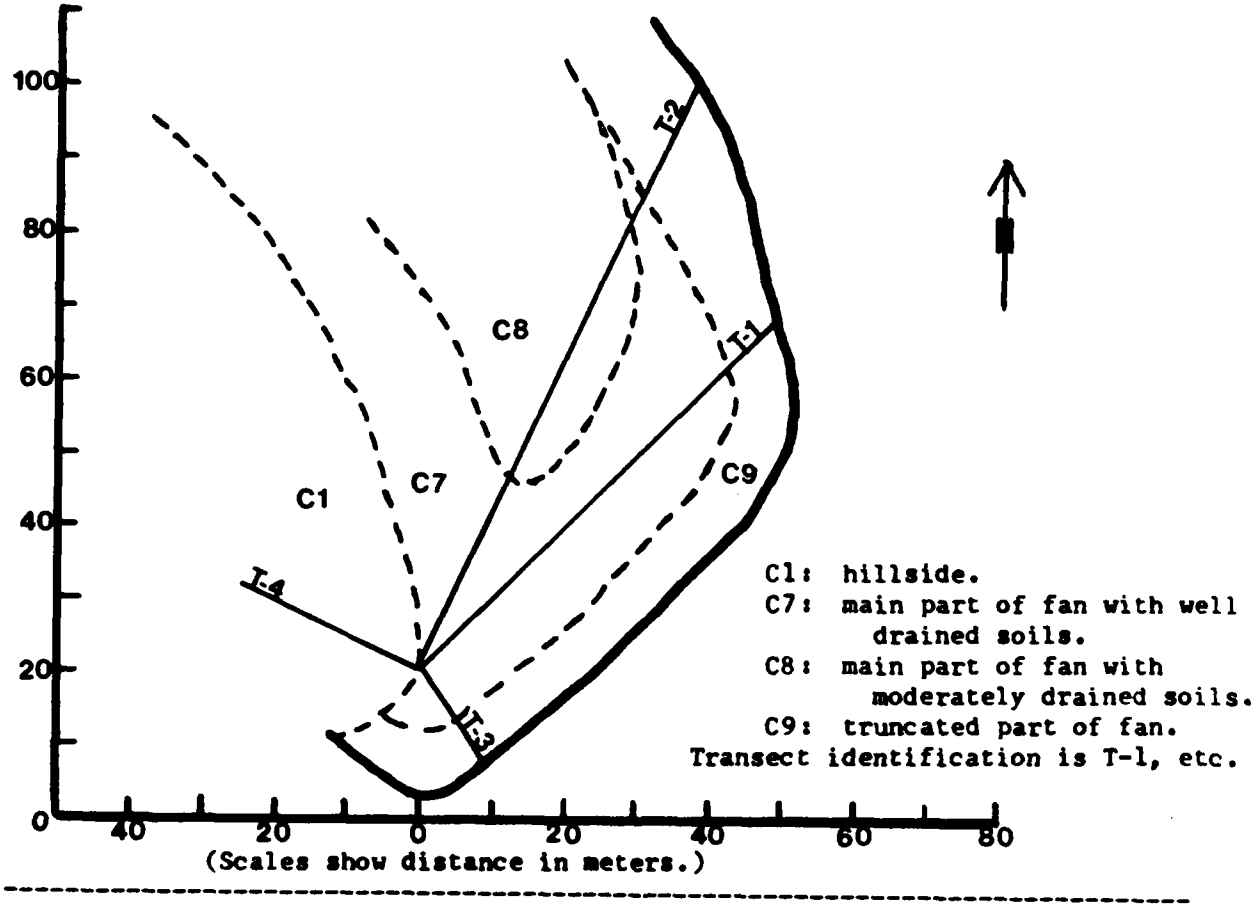
13PK315 is the last of the alluvial fan sites to be discussed in this report. As such, its geomorphology is similar to the other fan sites in many respects. As discussed previously, it is located on the same alluvial fan as 13PK314, but is separated from that site by a wide stream channel that has bisected the fan. Figure 34 shows the surface form of 13PK315. Note that the southern edge of the site area is formed by a steeply-sloping stream bank (T-3), as is the case for the northern edge of 13PK314, just across the channel (see Plates 26 and 27).

The stratigraphy of this site is essentially the same as that of the other fan sites: a stratum of loamy alluvial sediments (unit S5 in Figure 35), underlain by glacial till (unit S4). Some differences in composition of the sediments can be distinguished, however. At 13PK315, a C horizon of post-Saylorville sediments about 1 cm thick was found to overlay E1 and E2 horizons totaling 49 cm in thickness. (Note the complete absence of an A horizon in this locality.) The E horizons are underlain by Bt1, Bt2, Bt3, BC1 and BC2 horizons to 185 cm, and a C horizon was discerned from 185 to 230 cm (see Plates 28 and 29).

A comparison of the distribution of sand, clay, pH and organic carbon at various depths in the soils of 4 different alluvial fan sites was done as part of the laboratory analyses conducted during this project. The results of these analyses are shown in Figure 36. The differences in distribution of the measured qualities from site to site are, in part, due to differences in sample locations relative to the configurations of the fans. Well-drained soils were sampled at 13PK274 and 13PK314, and moderately well-drained soils were sampled at 13PK276 and 13PK315.

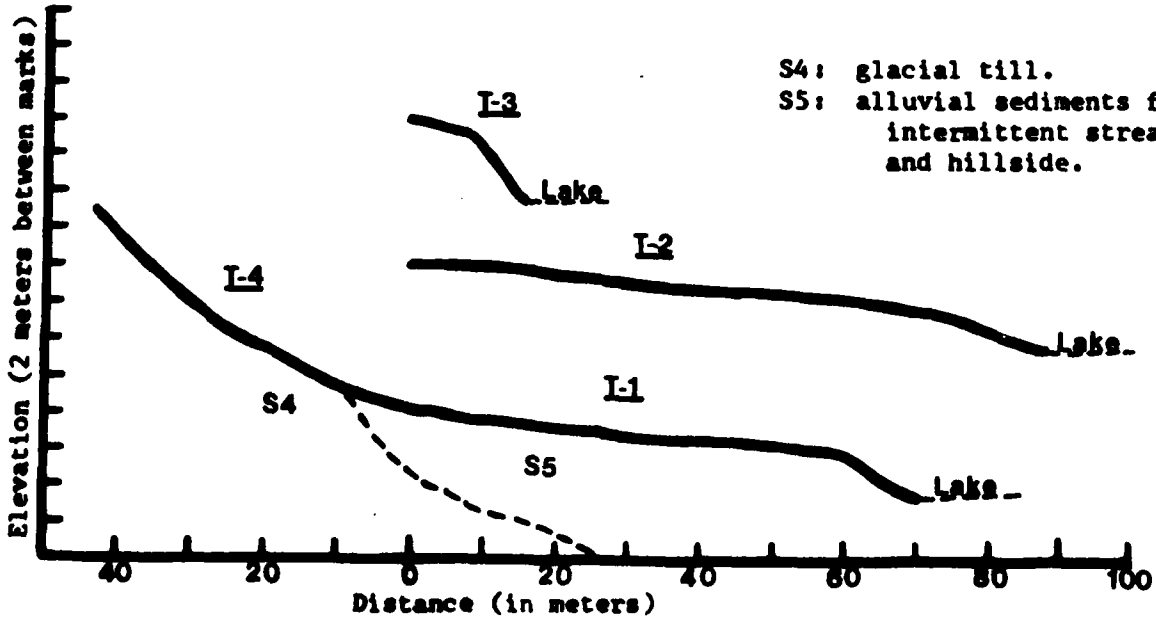
In Figure 36, part A, note the consistently higher sand content at 13PK315, regardless of the depth of the sample. The sampling location at this site was near the apex of the fan. Higher sand content is to be expected in such a location, because the feeder stream that created the fan had a greater slope in this area than on the lower-lying parts of the fan. The content of sand also varies with depth at all sample sites, as a result of lateral stream migration during the construction process. The distance of the stream from a specific area varies with time and consequently, the size of particles deposited there likewise varies (Schumm 1977). These deposits also contain small amounts of particles larger than sand. This, too, is to be expected,

Figure 34. Landform Components at 13PK315



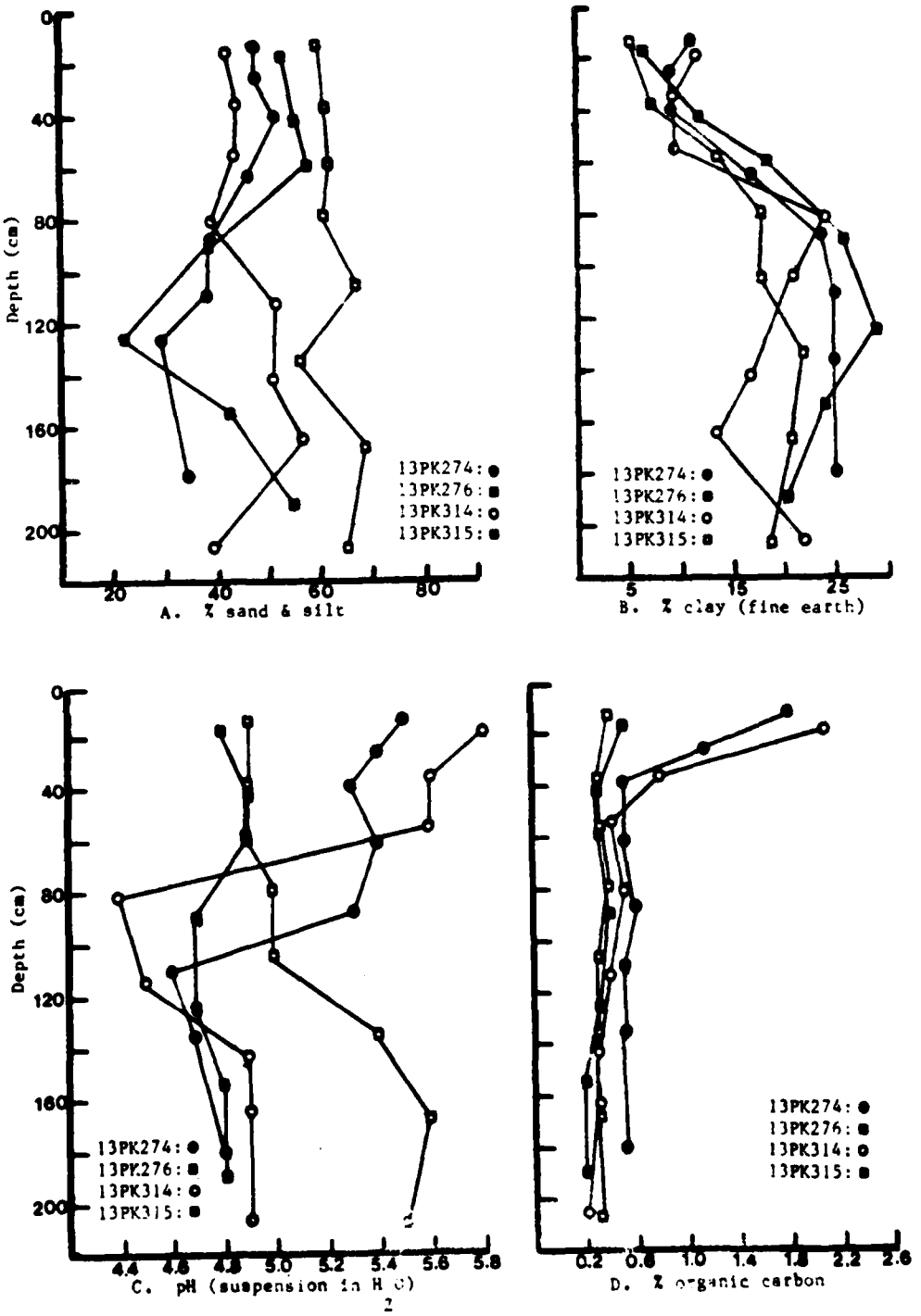
C1: hillside.
C7: main part of fan with well drained soils.
C8: main part of fan with moderately drained soils.
C9: truncated part of fan.
Transect identification is T-1, etc.

Figure 35. Stratigraphic Units at 13PK315



S4: glacial till.
S5: alluvial sediments from intermittent stream and hillside.

Figure 36. Distribution of Soil Properties at Alluvial Fan Sites



because the glacial till from which these sediments were derived contains only a small amount of such particles. However, discontinuous strata with noticeable amounts of such particles are present. These are perceived to be bed-load or lateral accretion sediments.

Part B of Figure 36 shows the distribution of clay with depth. Note that the content of clay, at least in the upper part of the B horizon, is about twice the amount in the overlying A and E horizons. Further, the content of clay in the upper part of the B horizon at 13PK315 is appreciably less than in that part of the other soils. This reflects the coarser texture of sediments near the apex of the fan.

In Part C of the figure, changes in pH with depth are shown. Although all the soils are rather acid throughout, pH in the upper part of the moderately well-drained soils is markedly less than in those parts of the well-drained soils. Part D shows the content of organic carbon with depth. The upper parts of the moderately well-drained soils contain much more carbon than do those same parts of the well-drained soils. However, the well-drained soils (13PK276 and 13PK315) lacked an A horizon, which may account for the majority of the inter-site differences in organic carbon content in the higher strata.

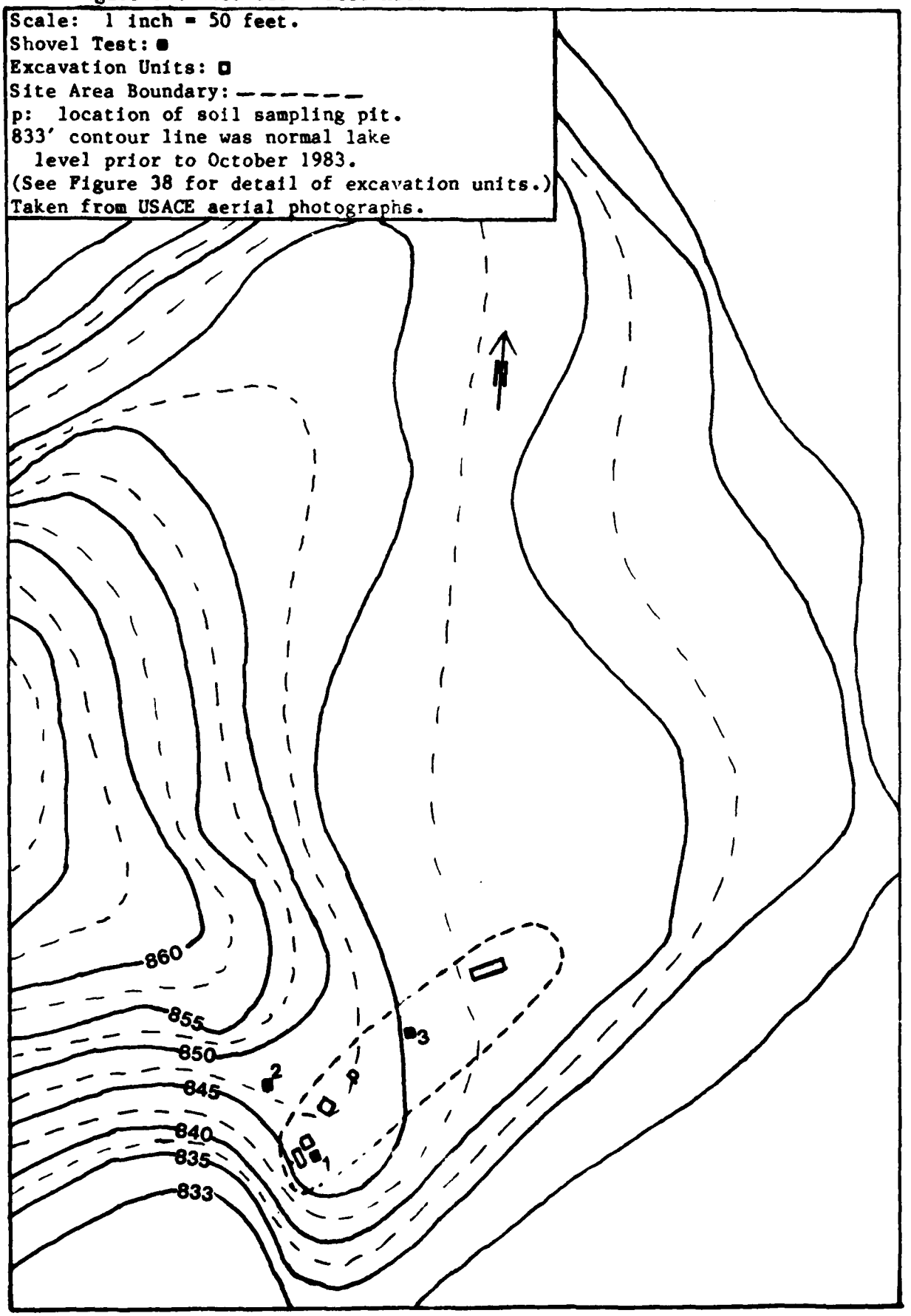
Archaeological Investigations

The results of the resurvey and testing procedures at 13PK315 were similar to the results obtained at 13PK314, in terms of the preservation conditions in the site area. That is, both sites had apparently been truncated on one side by an incising stream, and both sites had suffered horizontal reduction of the cultural component due to sheet erosion. Another similarity was in the quantity of surface artifacts recovered from each site. Both yielded very large amounts of cultural material, but, while the majority of the surface artifacts at 13PK314 were ceramics, most of the surface artifacts found at 13PK315 were lithics. Coupled with the fact that these two sites are located on two halves of the same alluvial fan, this distributional pattern suggested that the two sites may actually be part of one large site area which has been recently bisected by stream incisement. The differences in artifact types in the two areas might, then, reflect the presence of discrete activity areas within the site as a whole.

When the quick assessment phase of work began, the site area appeared to have endured the spring floods with a minimum of additional disruption. Three shovel tests were done to check the depth of the remaining subsurface component (see Figure 37). These three tests yielded only 6 waste flakes, from depths of 5 to 30 cm.

During geomorphological investigations at 13PK315, what appeared to be a fire hearth was encountered during excavation of a soil sampling pit (the location of the pit is shown in Figure 37). This feature was distinguished from the surrounding E horizon by a conspicuous increase in organic content and the presence of large amounts of charcoal. The top of the feature was at 30 cm below surface, and the soil matrix above it appeared to be intact and undisturbed. The feature measured 23 cm high by 36 cm wide at its widest point, and was roughly subconoidal in cross-section. A bulk sample of soil was taken from the feature for flotation. Several large pieces of charcoal were separately removed and submitted to Beta Analytic, Inc. for radiocarbon

Figure 37. 13PK315 - Site Area



assay. They yielded a date of 2,110 ± 330 B.P., or a range of 490 B.C. to A.D. 170.

Because of its topography, most of the site area was somewhat protected from loss of cultural materials due to wave action and inundation. It is also rather difficult to reach on foot, which reduced the probability of vandalism. An intensive examination of the surface of the site area was therefore done in hopes of recovering diagnostic artifacts. Because a heavy layer of sand had been deposited on the site by floodwaters, surface reconnaissance included screening of this layer of sand to find cultural materials.

After quick assessment was completed, areas for excavation were selected. The first excavation unit was located in the southwestern corner of the site, close to the location of a 1-m square unit that had been excavated in 1982. Eventually, two 1-m square units and six 50-cm square units were excavated at 13PK315 (see Plate 30). (Figure 38 shows the layout of the excavation units, and Figure 39 lists the artifactual materials recovered from them. Note that the density of material was somewhat lower in the units on the far eastern edge of the site area than in the western part of the site.) The deposit extended from surface to a depth of about 30 cm. The top 5 cm of every unit included a thin layer of recently deposited sand and sediments mixed by floodwaters. (The projectile point found in Unit 1 was in this stratum - see Plate 31.) No indication of a feature was found in any excavation unit.

The majority of the recovered subsurface material was debitage. Seven whole or broken tools were found, three of which came from the top 5 cm of the units. A small assemblage of ceramics (5 body sherds and 1 crumb) was also encountered in Unit 8, between 15 and 30 cm. Overall, the subsurface component was consistent in vertical distribution, showing a slightly higher concentration between 10 and 25 cm below surface, with no conspicuous sterile strata. Examination of the surface lag deposit yielded a greater return than excavation in terms of both quantity and kind of artifacts. The surface material included 10 body sherds, 9 projectile points, 23 scrapers, 10 other tools and a large quantity of utilized flakes and debitage.

Analysis of edgewear patterns on the recovered tools showed that the majority of them had been used, but the patterns were not clear enough to determine the types of material worked. This circumstance may reflect repeated use of a tool for several different tasks, which would tend to blur the wear patterns. In contrast, most of the utilized flakes in the assemblage exhibited clear edgewear patterns that could be readily identified. This indicates that flakes were used on an "as-needed" basis and discarded after one use, while manufactured tools were retained and used for several different functions.

The ceramics found at 13PK315 were all grit-tempered body sherds with distinctly cord-roughened surfaces. Four of the sherds have rather wide incised horizontal and oblique lines over the cord-roughening, but are too small to show their complete decorative motifs. Incised-over-cord-marked ceramics are associated with the Early Woodland period in eastern Iowa and western Illinois; the sherds from 13PK315 do appear similar to such types as Spring Hollow Incised and Black Sand Incised, but cannot be definitely identified as to type.

The projectile points recovered in 1983 are, for the most part, rather

Figure 38. Excavation Units at 13PK315

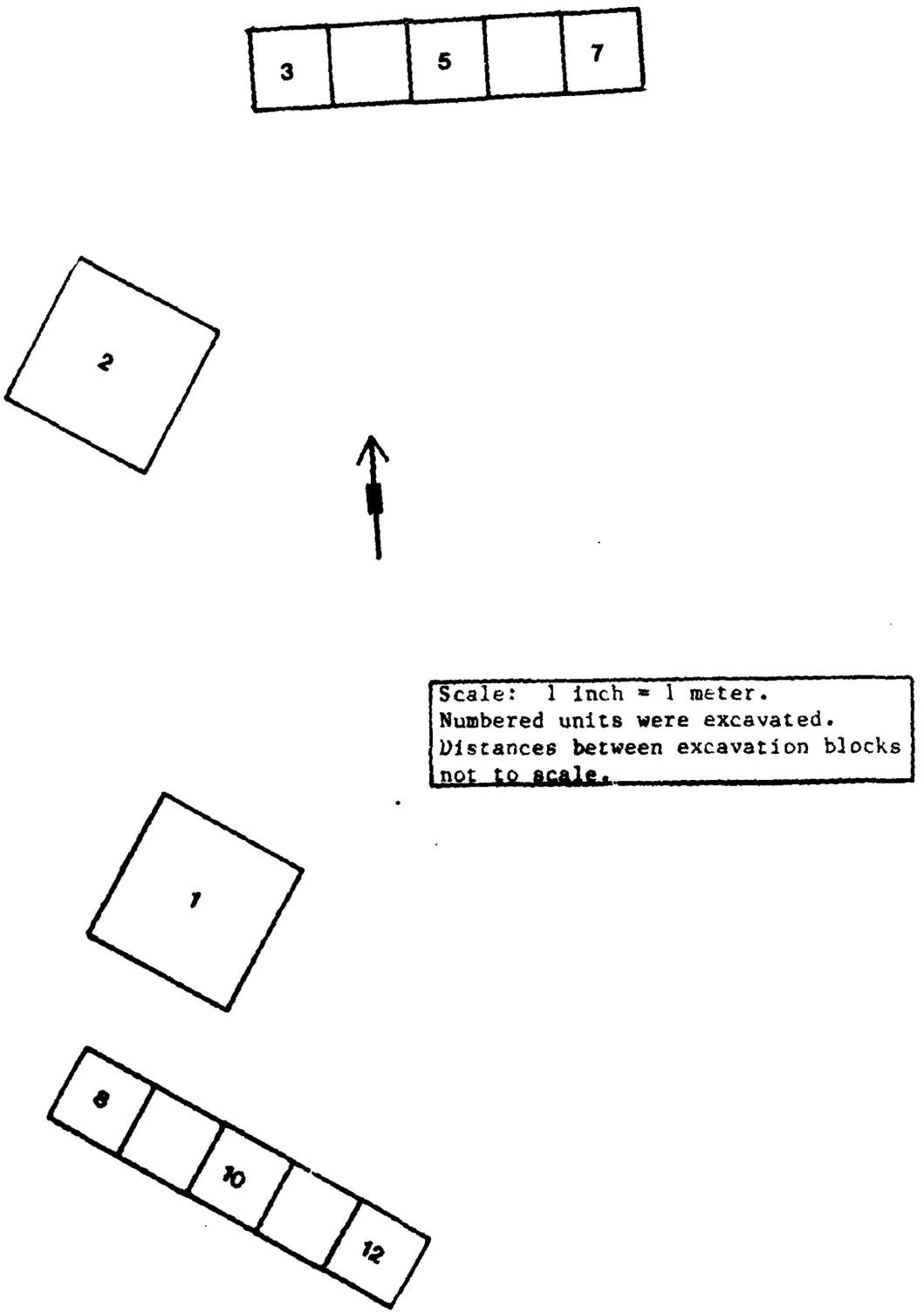


Figure 39. Material Recovered at 13PK315

Surface

28 core fragments
53 primary flakes
346 secondary flakes
7 tool fragments
1 hematite tool
1 hammerstone
23 scrapers:
- 1 turtleback
- 2 thumbnail
- 4 end
- 3 side
- 2 broken

2 punch/gravers
1 projectile point tang
9 projectile points:
- 4 stemmed
- 3 corner-notched
- 1 side-notched, reworked
- 1 triangular, broken

4 body sherds, cr
2 body sherds, cr/incised
4 body sherds (e)

Shovel Test 1

0-5 cm: 1 secondary flake
5-10 cm: 2 secondary flakes

Shovel Test 2

20-30 cm: 1 secondary flake

Shovel Test 3

5-10 cm: 1 secondary flake
10-20 cm: 1 secondary flake

Unit 1

0-5 cm,	NW:	5 secondary flakes
"	"	1 projectile point, corner-notched
"	NE:	3 secondary flakes
"	SE:	5 secondary flakes
"	SW:	7 secondary flakes
"	"	1 end scraper
5-10 cm,	NW:	2 secondary flakes
"	NE:	1 secondary flake
"	SE:	1 primary flake
"	"	2 secondary flakes
"	SW:	5 secondary flakes
10-15 cm,	NE:	6 secondary flakes
"	SE:	6 secondary flakes
"	SW:	1 primary flake
"	"	4 secondary flakes
15-20 cm,	NW:	1 primary flake
"	"	3 secondary flakes
"	"	1 retouch flake
"	NE:	2 secondary flakes
"	SE:	1 primary flake
"	"	4 secondary flakes
"	SW:	3 secondary flakes
"	"	3 retouch flakes
"	"	1 tool fragment
20-25 cm,	NW:	4 secondary flakes
"	NE:	1 secondary flakes
"	SE:	1 retouch flake
25-30 cm,	NW:	1 secondary flake
"	SE:	1 secondary flake
"	SW:	1 primary flake
"	"	2 secondary flakes

Unit 2

0-5 cm,	NW:	6 secondary flakes
"	NE:	1 primary flake
"	"	2 secondary flakes
"	SE:	1 primary flake
"	"	3 secondary flakes
"	"	1 retouch flake
"	SW:	1 primary flake
"	"	6 secondary flakes
"	"	1 tool fragment
5-10 cm,	NW:	5 secondary flakes
"	NE:	1 retouch flake
"	SE:	6 secondary flakes
"	"	1 blade flake
"	"	5 retouch flakes
"	SW:	1 primary flake
"	"	5 secondary flakes
"	"	1 retouch flake
10-15 cm,	NW:	1 primary flake
"	"	2 secondary flakes
"	NE:	2 secondary flakes
"	SE:	2 secondary flakes
"	SW:	3 secondary flakes
"	"	2 retouch flakes
15-20 cm,	NW:	2 secondary flakes
"	SE:	1 primary flake
"	"	3 secondary flakes
"	SW:	1 retouch flake
20-25 cm,	NW:	1 secondary flake
"	"	1 retouch flake
"	SW:	6 secondary flakes
"	"	1 retouch flake
25-30 cm,	NW:	1 secondary flake

Unit 3

0-5 cm:	1 primary flake
10-15 cm:	2 secondary flakes
"	1 retouch flake

Unit 5

0-5 cm:	1 secondary flake
5-10 cm:	1 secondary flake
"	1 retouch flake
10-15 cm:	2 secondary flakes
"	1 retouch flake
20-25 cm:	1 secondary flake

Unit 7

5-10 cm:	1 secondary flake
10-15 cm:	1 secondary flake
"	1 retouch flake
15-20 cm:	1 blade flake

Unit 8

0-5 cm:	3 secondary flakes
5-10 cm:	3 secondary flakes
10-15 cm:	6 secondary flakes
15-20 cm:	2 secondary flakes
"	1 body sherd, cr/incised
20-25 cm:	4 secondary flakes
"	1 groundstone tool
"	1 body sherd (e)
"	4 ceramic crumbs
25-30 cm:	3 secondary flakes
"	1 body sherd, cr
"	2 body sherds, cr/incised
"	1 ceramic crumb

Figure 39, continued

Unit 10

0-5 cm:	5 secondary flakes
5-10 cm:	2 secondary flakes
10-15 cm:	1 secondary flake
"	1 retouch flake
15-20 cm:	1 primary flake
"	4 secondary flakes
"	1 retouch flake
20-25 cm:	2 secondary flakes
25-30 cm:	1 secondary flake

Unit 12

0-5 cm:	2 secondary flakes
5-10 cm:	4 secondary flakes
"	1 retouch flake
10-15 cm:	1 body sherd (e)
15-20 cm:	2 core fragments
"	5 secondary flakes
20-25 cm:	3 secondary flakes

poorly made, with asymmetrical, thick cross-sections and no consistent flaking patterns. Several show signs of having been used for cutting and scraping. Half of the points are stemmed, and the remainder are corner-notched. One large corner-notched point appears to be a variant of the Snyder's point associated with Havana-Hopewell cultures in Illinois. The stemmed points, however, more closely resemble typical Archaic forms.

The radiocarbon date obtained for this site seems to be a reasonable age estimate, given the character of the ceramics and lithics found at the site, placing the occupation at 13PK315 in the early part of the Middle Woodland period. However, the association between the feature from which the radiocarbon date was obtained and the rest of the cultural deposit is not overly strong. The flotation sample from the feature yielded very large proportions of charcoal and charred plant remains, but only one piece of obvious cultural material: a chert retouch flake. If this radiocarbon date does reflect the actual time of occupation at 13PK315, it has some implications for the use of "diagnostic" point forms for establishing cultural chronologies. It suggests that Archaic forms persisted into the Woodland period, and were supplemented, but not replaced, by new types of points. The presence of "Archaic" points at a particular site, therefore, may not necessarily be a clear indication of cultural affiliation.

Because part of the cultural deposit at 13PK315 had been lost prior to excavation, a complete picture of the occupation could not be obtained. The area that was available for examination did, however, seem to be the location of some specialized activities, as evidenced by the high proportion of finished tools and utilized flakes to debitage. Many of the tools and flakes had been used for cutting meat and bone; together with the presence of numerous scrapers, this points to butchering and/or hide-processing as a possible activity that was taking place at this site. If the site was a habitation, one would expect to find a greater number of ceramic artifacts, although the lack of such items may also have resulted from the loss of part of the cultural deposit to erosion.

Because of the respective geomorphological positions of 13PK314 and 13PK315 - each on one half of a stream-bisected alluvial fan - the ceramic assemblages from the two sites were compared to see if any strong similarities appeared. Although the incised sherds found at 13PK315 show the same basic pattern of incising as some sherds found at 13PK314 (diagonal above horizontal lines), the details of the decoration are quite different, and the two assemblages can be readily distinguished. A few projectile points were also found at 13PK314 which somewhat resemble points from 13PK315. This is scant evidence for a connection between the two sites, however, since many point forms have been shown to appear with consistency over large geographic areas and long periods of time. Overall, data recovery yielded no firm evidence to support the hypothesis that 13PK315 and 13PK314 were at one time a single large occupation area.

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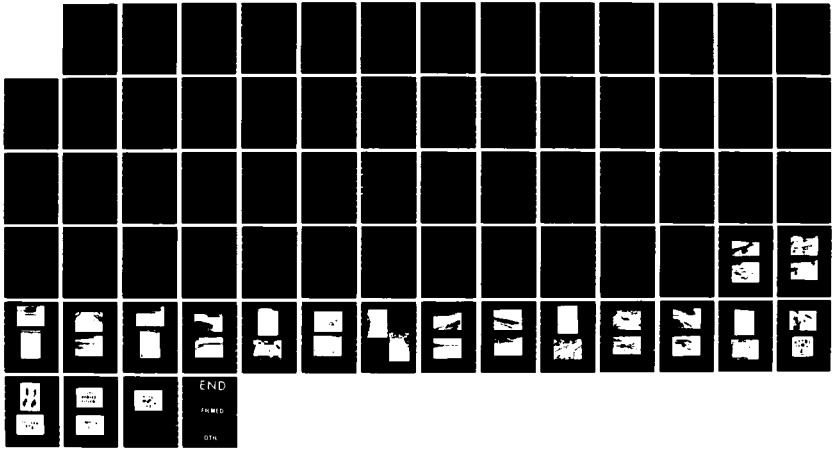

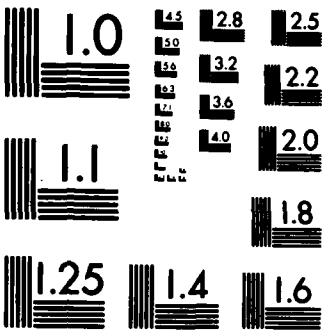

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SUMMARY

Capsule descriptions of the seven sites discussed in this report are presented on the following pages. These descriptions are provided as a means of summarizing what is now known about these sites. It should be emphasized that the site descriptions are based almost entirely on data recovered during subsurface testing and excavation. Diagnostic materials have been found on surface at all of these sites, but the tenuous provenience of those artifacts makes them rather suspect as a basis for any descriptive statements.

The reader will note that none of the excavated sites had particularly deep cultural deposits; the thickest concentration of artifacts was found at 13PK276, which contained a fairly consistent deposit from surface down to 40 cm. The shallowest deposit was at 13PK23, where the average depth of cultural material was 15 cm. It is virtually certain that all of these sites had deeper deposits prior to the creation of Saylorville Lake. (For example, the complete loss of the A horizon at 13PK315 must have removed a portion of the cultural deposit.) The only possible exception to this may be 13PK259, which did not appear to have suffered much sheet erosion.

The site with the smallest remaining horizontal extent was 13PK23, which was no more than 15 x 20 m in size. The largest site was 13PK259, with a site area of at least 48 x 73 meters. Again, the horizontal components of these sites had all undoubtedly been reduced by shoreline erosion and bank slumpage between 1977 and 1983. Some of them may have been considerably larger at one time; the identification of 13PK23 as a Late Woodland habitation, for instance, indicates that it originally must have been much larger than it was in 1983. Unfortunately, at this point there is no reliable way to reconstruct the original configurations of the site areas. It must be assumed that, in every case, only a part of the original site area was sampled during data recovery.

Overall, the sites exhibit evidence of considerable damage by both natural (inundation, sheet erosion, bank slumpage) and cultural (tree-clearing, vandalism) forces. Ironically, these sites probably were in very good condition prior to the creation of Saylorville Lake. None of the alluvial fan sites had ever been under cultivation, and, although they may have been somewhat affected by natural landscape alteration processes, the fans were probably essentially intact before the impoundment of lake waters accelerated the rates of incisement and erosion along the lakeshore. Both 13PK259 and 13PK264 had been under cultivation, but only the upper reaches of 13PK259 were disturbed by plowing, and the cultural deposit at 13PK264 appears to be entirely below the plow zone and would have been accessible for study prior to the construction of Saylorville Dam. Given the amount of cultural material recovered from these sites even after they had been disrupted, the use of meticulous survey methods during the original site surveys at Saylorville Lake should have revealed their presence.

Comparison of the artifact assemblages from the different sites shows very little redundancy in types and quantities of cultural materials from site to site. Although ceramics were found at every site, some contained only a few sherds while others contained hundreds. Each ceramic assemblage differs from the others as regards temper, color, morphology, surface treatment and decoration. Similarly, the lithic assemblages show considerable inter-site

variation, in terms of raw material types, relative proportions of debitage and finished items, tool types and utilization patterns.

By themselves, these sites do not constitute a statistically valid sample of the total resource base in the project area. They reflect prehistoric settlement on only three landforms: five of the seven sites were located on alluvial fans, one on a high terrace and one, apparently, on an intermediate terrace. They cannot, therefore, serve as the basis for any generalizations about settlement patterning, since such a limited range of landforms is represented. These sites do, at least, testify to the presence of a range of prehistoric activities in the Central Des Moines River Valley, in both temporal and functional dimensions.

13PK23

Location: truncated alluvial fan overlaying glacial till; elevation 834'-837'.
Horizontal Extent: 15 m x 20 m.
Vertical Extent: maximum 0-30 cm; average 0-15 cm.
Condition: truncated by incised drainageway; severely eroded; possible vandalism.
Area Excavated: 8 square meters (1983); 3 square meters (1982).
Artifact Assemblage: grit-tempered sherds: Late Woodland single-cord-impressed decoration, Middle Woodland bossed and incised decoration; debitage; projectile points, scrapers.
Features: remnant of rectangular structure: partial south and west walls and eastward extension.
Cultural Affiliation: probable multi-component: Middle and Late Woodland.
Function: habitation ("village").
RP3 Study Unit Classification: Mississippi Basin Woodland, Middle and Late Woodland subunits; possible association with Plains Woodland, Middle and Late Woodland subunits.
Effects of Pool Raise: complete inundation at winter level; partial inundation and severe erosion at summer level.

13PK259

Location: high terrace on edge of floodplain at mouth of large drainage; elevation 835'-838'.
Horizontal Extent: 46 m x 73 m.
Vertical Extent: maximum 0-50 cm; average 0-35 cm (plow zone 0-25 cm).
Condition: truncated and filled along southern boundary; possibly truncated along eastern edge by flooded stream mouth; cultivated.
Area Excavated: 10.5 square meters (1983); 2 square meters (1982).
Artifact Assemblage: few grit-tempered, cord-roughened body sherds; large amounts of debitage; projectile points; scrapers, large knives; bovid teeth.
Features: none.
Cultural Affiliation: ceramics indicate indeterminate Woodland.
Function: probably hunting/butchering camp; possible multiple short-term occupations.
RP3 Study Unit Classification: undefinable Woodland-period component.
Effects of Pool Raise: complete inundation at winter level; partial inundation and severe erosion at summer level.

13PK264

Location: low terrace (recent) overlaying intermediate terrace on edge of floodplain at mouth of large drainage; elevation of site area apparently below 833'.
Horizontal Extent: undetermined.
Vertical Extent: undetermined.
Condition: inundated; covered by cap of recent (probably post-settlement) sediments.
Area Excavated: 2 square meters (1982).
Artifact Assemblage: grit-tempered, cord-roughened body sherds; shell-tempered sherds (faint trailing, one loop handle); burned bone; debitage (all material found on surface).
Features: none.
Cultural Affiliation: Woodland; also possible Oneota component.
Function: undetermined.
RP3 Study Unit Classification: undefinable Woodland-period component; Moingona-Burlington association suggested by Oneota ceramics.
Effects of Pool Raise: complete inundation.

13PK274

Location: truncated alluvial fan overlaying glacial till; elevation 835'-838'.
Horizontal Extent: 23 m x 23 m.
Vertical Extent: maximum 0-40 cm; average 10-35 cm.
Condition: truncated on south and east by incised drainageway and wave action; some subsurface disturbance between 0 and 15 cm; possible vandalism.
Area Excavated: 7 square meters (1983); 2.8 square meters (1982).
Artifact Assemblage: grit-tempered body, neck and rim sherds, Havana/Cedar Ware, also incised (Spring Hollow?) sherds; debitage; projectile points; abrader; scrapers.
Features: none.
Cultural Affiliation: Middle Woodland; ceramics indicate Havanoid association.
Function: habitation, probably seasonal.
RP3 Study Unit Classification: Mississippi Basin Woodland, Middle Woodland subunit.
Effects of Pool Raise: complete inundation at winter level; partial inundation and severe erosion at summer level.

13PK276

Location: truncated alluvial fan overlaying erosional surface in till and glacial till; elevation 860'-867'.
Horizontal Extent: 35 m x 38 m x 30 m.
Vertical Extent: maximum 0-45 cm; average 0-40 cm.
Condition: truncated on east by bank slumpage; moderate sheet erosion.
Area Excavated: 3 square meters (1983); 2 square meters (1982).
Artifact Assemblage: large quantities of unworked cores, partially reduced cores and debitage (most not utilized); body sherds, scrapers, points; tools used primarily to cut and scrape wood.
Features: none.
Cultural Affiliation: ceramics indicate indeterminate Woodland.
Function: probable lithic workshop.

RP3 Study Unit Classification: undefinable Woodland-period component.
Effects of Pool Raise: inundation and sheet erosion during high-water episodes; severe bank slumpage due to wave undercutting.

13PK314

Location: truncated alluvial fan overlaying glacial till; elevation 835'-840'.
Horizontal Extent: 42 m x 48 m.
Vertical Extent: maximum 0-45 cm; average 0-35 cm.
Condition: truncated on north and east by incised drainageway and wave action; severely eroded; possible vandalism.
Area Excavated: 7.75 square meters (1983); 4.25 square meters (1982).
Artifact Assemblage: grit-tempered sherds: bossed and incised decoration; debitage, tools.
Features: hearth, possibly associated with ceramic manufacture.
Cultural Affiliation: Middle Woodland; possible Havanoid association.
Function: habitation.
RP3 Study Unit Classification: Mississippi Basin Woodland, Middle Woodland subunit; possible association with Southern Iowa Woodland.
Effects of Pool Raise: permanent partial inundation, severe erosion from wave action.

13PK315

Location: truncated alluvial fan overlaying glacial till (was part of same fan upon which 13PK314 is located); elevation 835'-848'.
Horizontal Extent: 15 m x 30 m.
Vertical Extent: maximum 0-30 cm; average 5-25 cm.
Condition: truncated on south and southwest by incised drainageway; severely eroded.
Area Excavated: 3.75 square meters (1983); 2.25 square meters (1982).
Artifact Assemblage: large numbers of points, scrapers, other tools; debitage; grit-tempered, incised sherds.
Features: hearth cut through in soil sampling pit.
Cultural Affiliation: Early to early Middle Woodland; radiocarbon date of 2,110 B.P. $\pm$ 330 obtained from charcoal in hearth.
Function: indeterminate; excavated portion of site area may have been butchering or food-processing area.
RP3 Study Unit Classification: Mississippi Basin Woodland, Early and Middle Woodland subunits; possible association with Plains Woodland, Early Woodland subunit; possible overlap with Late Archaic, Prairie/Plains or Eastern subunit.
Effects of Pool Raise: partial inundation at winter level; accelerated bank slumpage due to wave action.

LITHIC DESCRIPTION

The lithic artifacts collected during data recovery are briefly discussed in the following pages on a site-by-site basis. A summary description of several aspects of the entire collection is first presented. For the purposes of summary, the assemblage is divided into a few major subsets: projectile points, manufactured tools, utilized and/or retouched flakes, and debitage (unaltered waste materials). These categories were defined, for the most part, on the basis of form, which is not always an unfailing indicator of function. For instance, a few items in the collection that have the form of whole or broken projectile points can be shown to have been used for cutting and scraping. (It may be that such "lateral recycling" of tools was a common practice, especially in areas where good sources of raw material were scarce.) Manufactured tools are distinguished from utilized flakes according to the degree of purposeful shaping. Utilized flakes often show signs of retouching along one or more edges, but are not modified to the extent of more "formal" tools. The tool category also includes what are termed "blade flakes": long, narrow flakes, probably struck off a pyramidal core, which have been extensively retouched on their long edges. The debitage category includes primary and secondary decortication flakes, retouch flakes created during finishing of a tool or reworking of an edge, and core fragments.

The relative proportions of these different types of lithic artifacts within one assemblage should give some indication of the types of activities that were carried on at that site. However, the assemblages discussed here cannot be considered statistically valid samples of the total original set of lithic artifacts at each site. Every site had suffered the loss of at least part of its cultural deposit prior to data recovery, and a corresponding portion of the lithic assemblage, of unknown configuration, was also lost. If excavation had taken place before Saylorville Dam went into operation, a somewhat different distribution of raw materials, tool types and debitage may have been observed. Another troublesome factor is the probability that the assemblage from each site has been skewed by unauthorized removal of artifacts. Among the sites chosen for data recovery, 13PK23, 13PK274 and 13PK314 were the most readily accessible to the public. The number of points and tools to be found on surface, at these sites at least, probably had been reduced by amateur collecting activities.

The purpose of the data recovery program was to maximize return in a limited amount of time, and not to examine a formally defined sample of each site area. For this reason, and because of the factors mentioned above, the artifacts discussed here may not reflect the entire range of activities conducted at each site. Therefore, we cannot say with any certainty that a particular activity was not being carried out at a given site. It is possible, however, to identify some activities that were taking place when each site was occupied.

Since 13PK23 appears to have had two components, the total assemblage from that site is divided into surface and subsurface materials as a rough representation of those components. The subsurface artifacts appear to constitute the remaining portion of the Middle Woodland component at this site. Surface materials, however, probably include some Middle Woodland materials washed out of the fan by recent erosion, mixed with lag deposits left when the Late Woodland occupation stratum was eroded away. At this point,

there is no way to definitely separate the earlier materials from the later. For the rest of the sites, no clear indications of multiple occupation were uncovered, so the surface and subsurface artifact assemblages have been combined for the purposes of discussion.

A summary of the lithic assemblages from the seven examined sites is shown in Figure 40. Each assemblage is broken down into six categories: projectile points, tools, and four types of debitage. The number of artifacts of each type in the assemblage is shown, as is the percentage of the site's total assemblage that each category represents. At the bottom of the chart, the number of items in each assemblage that can be identified as utilized, retouched, both retouched and utilized or heat-treated is shown. The percentage figures here indicate the proportion of the total assemblage that falls into each category.

The relative frequencies of the different artifact types are fairly consistent from site to site, with only a few exceptions. Notice that the percentage of retouch flakes is much higher at 13PK259 than the other sites, while the percentages of primary and secondary flakes are much lower than the norm. This distribution appears to reflect intensive tool use and resharpening as opposed to initial manufacture of tools.

13PK276 is another site at which the relative proportions of debitage types seems to reflect specific activities that were taking place during occupation. Here, the percentages of secondary and retouch flakes are relatively high, and the percentage of primary flakes is low. Tools are conspicuously lacking, also. Perhaps this distribution is indicative of the manufacturing process, employing cores that were already partially reduced.

Another means of summarizing the lithic assemblages from these sites is in terms of the types of raw materials used in tool manufacture. In Figure 41, the lithic artifacts from each site are categorized according to material. Fairly broad categories were used for sorting out the material types. Cherts, flints, jaspers and chalcedonies were differentiated according to texture, color and luster, but finer distinctions were not made within each category.

At every site, chert was the most common material. There was considerable heterogeneity in the cherts from each site, however: colors range from white and off-white to yellow, pink, gray and brown, and textures range from very coarse to very fine-grained. No single type of chert appears to dominate the assemblage from any site. The same kind of variety appeared from site to site: each site contained at least a few varieties of chert that were not found at any other site. (Because so few lithic artifacts were found at 13PK264, all of which were in secondary deposition, it is not included in this discussion.)

Smaller quantities of eight other types of material were found at each site. The greatest variety appears at 13PK314, which yielded moderate amounts of each type of material. At 13PK315, oolitic chert was four times more common than at the other sites, and jasper was about twice as common. The highest proportions of chalcedony, quartz and quartzite were all found at 13PK276, which also had the lowest occurrence of oolitic chert. More flints were found at 13PK259 than any other site, but oolitic chert, jasper and hematite were rare.

Figure 40. Distribution of Lithic Artifact Types

	13PK23 (surface)	13PK23 (sub-surface)	13PK259	13PK264	13PK274	13PK276	13PK314	13PK315
points	1	-	1	-	1	4	7	11
(%)	(1.23)	(-)	(0.11)	(-)	(0.47)	(0.23)	(1.06)	(1.56)
tools	10	4	20	-	18	18	21	40
(%)	(12.35)	(5.88)	(2.13)	(-)	(8.37)	(1.05)	(3.17)	(5.67)
cores	4	1	11	-	12	32	20	30
(%)	(4.94)	(1.47)	(1.17)	(-)	(5.58)	(1.87)	(3.02)	(4.26)
primary flakes	9	7	16	1	17	109	60	66
(%)	(11.11)	(10.29)	(1.71)	(10.00)	(7.91)	(6.36)	(9.06)	(9.36)
secondary flakes	57	54	561	9	155	1392	501	533
(%)	(70.37)	(79.41)	(59.74)	(90.00)	(72.09)	(81.21)	(75.68)	(75.60)
retouch flakes	-	2	330	-	12	159	53	25
(%)	(-)	(2.95)	(35.14)	(-)	(5.58)	(9.28)	(8.01)	(3.55)
total lithics	81	68	939	10	215	1714	662	705
(%)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)
utilized flakes	9	1	62	-	9	40	37	23
(%)	(13.64)	(1.64)	(10.75)	(-)	(5.23)	(2.66)	(6.50)	(3.84)
retouched flakes	1	2	-	-	2	-	-	6
(%)	(1.52)	(3.28)	(-)	(-)	(1.16)	(-)	(-)	(1.00)
retouched & util.	-	1	4	-	1	8	3	7
(%)	(-)	(1.64)	(0.69)	(-)	(0.58)	(0.53)	(0.45)	(1.17)
heat-treated	1	-	-	-	1	6	-	6
(%)	(1.52)	(-)	(-)	(-)	(0.58)	(0.40)	(-)	(1.00)

(Percentage figures for utilized, retouched and heat-treated flakes are based on the total number of primary and secondary flakes in the assemblage from each site.)

Figure 41. Distribution of Lithic Materials

	13PK23 (surface)	13PK23 (sub-surface)	13PK259	13PK264	13PK274	13PK276	13PK314	13PK315
chert	62	55	751	10	168	1313	523	468
(%)	(76.54)	(80.88)	(79.98)	(100.0)	(78.14)	(76.61)	(79.0)	(66.38)
jasper	5	5	16	-	11	140	46	109
(%)	(6.17)	(7.35)	(1.70)	(-)	(5.11)	(8.17)	(6.95)	(15.46)
chalcedony	2	1	51	-	8	105	21	11
(%)	(2.47)	(1.47)	(5.43)	(-)	(3.72)	(6.12)	(3.17)	(1.56)
flint	7	-	89	-	13	31	37	8
(%)	(8.64)	(-)	(9.48)	(-)	(6.05)	(1.81)	(5.59)	(1.14)
oolitic chert	4	1	5	-	6	8	16	93
(%)	(4.94)	(1.47)	(0.53)	(-)	(2.79)	(0.46)	(2.42)	(13.19)
quartz	-	-	21	-	3	61	14	5
(%)	(-)	(-)	(2.24)	(-)	(1.40)	(3.56)	(2.12)	(0.71)
quartzite	-	-	4	-	2	55	2	5
(%)	(-)	(-)	(0.42)	(-)	(0.93)	(3.21)	(0.30)	(0.71)
hematite	1	6	1	-	-	1	3	4
(%)	(1.24)	(8.83)	(0.11)	(-)	(-)	(0.06)	(0.45)	(0.58)
granite	-	-	1	-	4	1	-	2
(%)	(-)	(-)	(0.11)	(-)	(1.86)	(0.06)	(-)	(0.28)
Total	81	68	939	10	215	1714	662	705
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)

The heterogeneity of these assemblages is, of course, to be expected in an area in which till deposits, rather than bedrock inclusions, are the primary sources of raw material. Glacial action creates till deposits in a non-discriminatory fashion; different types of materials are distributed in the till in proportions that should reflect the frequency of their natural occurrence. Thus, one would assume that the relative rates of availability of the different materials should be fairly constant. Any significant differences in the distribution of these materials in cultural deposits would therefore be the result of a conscious selection process carried out by those "mining" the till deposits. The significance of this selective use of different raw materials is unclear, however; it may reflect individual preferences, cultural biases or technological norms changing over time.

Analysis of micro-edgewear patterns on tools and utilized flakes was also done as part of the lithic analysis. This procedure involves examination of the edges of used implements under low-power magnification. The kind of use damage seen on the artifact and its placement relative to the tool edge indicate first, what action was performed with the implement and, second, the kind of material that was worked.

Figure 42 summarizes the results of edgewear analysis of artifacts from six sites at Saylorville Lake. Any manufactured tools or flakes that appeared to have been utilized were examined. Overall, it was somewhat easier to identify the action performed with the implement than it was to positively identify the material that was worked; this condition might indicate that an artifact was used on several different types of material. In some cases, an artifact exhibited evidence of use but no definable pattern of edgewear. These are listed in Figure 42 as "indeterminate" items. This designation was used in either of two situations: if the implement was made from a coarse-grained material that does not show clear wear patterns, or if the implement had been retouched or re-utilized to such an extent that wear patterns were obscured.

Certain specific uses of lithic tools are very difficult to definitely identify by means of edgewear analysis. As Keeley's study of experimental edgewear patterns shows (1980:83), the patterns created by meat cutting are virtually undistinguishable from the patterns created by fleshing of wet hide. Thus, our analysis did not attempt to distinguish between these two activities. Overall, wear patterns created by hide-working are highly variable, depending on which side of the skin is being worked and how fresh it is. As an example, Keeley recounts an experimental de-hairing of rabbit hide that produced virtually no observable use wear on the tools (1980:53). It seems reasonable to assume that some of the artifacts listed as "indeterminate" in Figure 42 probably were used in hide processing.

Several conclusions can be drawn from the results of the edgewear analysis. First, it shows that artifact designations based on form can be accurate in some cases, but not all. Of the artifacts termed "scrapers" on the basis of morphology, 80% could be easily identified as having been used for scraping. Another 13% of the scrapers examined were classified "indeterminate", partly due to coarse-grained material. About 2/3 of the blade flakes were used as cutting tools, with most of the remainder having been used for scraping. Other tool types did not exhibit as clear a relationship between form and function. Among the smaller bifacial tools, the full range of identifiable usewear patterns was found. Even large bifaces,

Figure 42. Results of Edgewear Analysis

Tools	13PK23 (surface)	13PK23 (sub-surface)	13PK259	13PK274	13PK276	13PK314	13PK315
indeterminate:	-	-	1	1	-	4	10
scraping:							
bone:	2	3	1	5	1	1	1
wood:	-	-	-	1	1	-	1
unknown material:	-	-	2	1	1	4	18
cutting:							
bone:	-	1	6	-	-	6	3
wood:	-	-	-	-	-	-	-
meat/hide:	-	-	-	-	-	2	-
unknown material:	1	-	6	-	-	-	3
other uses:*	-	-	1	-	-	1	1
Total:	3	4	11	8	3	18	37

* one tool from 13PK259 was used to cut bone and scrape unknown material.
one tool from 13PK314 and one from 13PK315 were used to cut and scrape bone.

Flakes							
indeterminate:	-	1	-	-	7	9	4
scraping:							
bone:	4	3	30	1	10	7	3
wood:	-	-	2	1	3	1	2
unknown material:	-	-	1	2	6	6	12
cutting:							
bone:	4	-	6	3	12	7	13
wood:	-	-	-	-	-	1	1
meat/hide:	1	-	3	-	2	-	4
unknown material:	-	-	-	-	1	1	-
other uses:*	-	-	1	1	1	2	2
Total:	9	4	43	8	42	34	41

* one flake from 13PK259 was used to scrape bone and cut meat or hide.
one flake from 13PK274 was used to cut bone and scrape unknown material.
one flake from 13PK276 was used to cut bone and meat or hide.
one flake from 13PK314 was used to scrape wood and bone and one was used to scrape wood and cut bone.
one flake from 13PK315 was used to cut bone or meat.

catalogued as "knives", proved to have been used for a variety of purposes and not solely for cutting. A few artifacts the size and form of stemmed projectile points were found to have been used for cutting or scraping. In two cases, the points were unmodified. One other point had clearly been reworked after breaking to serve as a scraper.

There was a relatively high proportion of utilized flakes in the assemblages from these sites. Utilized flakes were as common as manufactured tools at every site, and were much more common at two sites: at 13PK259, the ratio of tools to utilized flakes was 1 to 4, and at 13PK276 the ratio was 1 tool to every 14 utilized flakes. Here again, we see evidence that these two sites were occupied for some specialized purpose which required the use of immediately available implements. Most of the utilized flakes carried clearly-identifiable edgewear patterns, which suggests that they were used as needed and quickly discarded.

13PK23

Most of the lithic assemblage from this site was found on the surface of the site, in wave-disturbed sand and silt deposits. A smaller proportion of debitage (mostly secondary flakes) and a few tools were found during excavation.

Most of the identifiable tools found at 13PK23 are small scrapers, round or ovoid in shape, pressure-flaked to create a low bevel along one edge. Wear patterns indicate that they were used for scraping a variety of materials. Five blade flakes that show evidence of use along one or both longitudinal edges were also recovered. One medium-sized, corner-notched projectile point was found on surface.

The tools that were found are not well-made, for the most part. Some of the scrapers are little more than thick flakes that were minimally altered. This circumstance, however, probably resulted at least in part from unauthorized removal of artifacts from the site area, and it may not reflect the actual nature of the lithic industry at 13PK23 (see Plate 32).

13PK259

The lithic assemblage from this site includes a very low percentage of tools. This fact reinforces our view of 13PK259 as a special-function site: if a variety of different tasks were being performed at the site, one would expect to find a variety of tools in the cultural deposit. One-third of the recovered tools are blade flakes, which require a minimum of shaping and finishing. Another third of the assemblage consists of fragments of broken tools, which cannot be functionally identified. The two scrapers that were recovered are both teardrop-shaped with narrowed ends that appear to have been designed for hafting.

Three of the tools found at 13PK259 were large chert knives of a common pattern. A fourth knife of the same pattern was found during intensive testing in 1982. These knives, which were used to cut bone and meat, were not carefully finished; they are asymmetrical and thick in cross-section, with a random percussion flaking pattern and very little evidence of pressure flaking. The four knives are all manufactured from the same material - a

distinctive blue-white chert - and their finished size (averaging about 12 cm long and 4.5 cm wide) indicates that the toolmaker probably started the reduction process with rather large cores. It seems that the probability of finding four large cores of identical chert in till deposits would be rather low. Thus, it seems likely that these knives were made from an imported material, rather than till cherts from the immediate vicinity of the site.

One broken side-notched projectile point was found between 0 and 10 cm in the large block of excavation units on the eastern side of the site area. The tip and approximate upper one-third of the body are missing; the remaining portion measures 1.8 cm in length. It is finely made, triangular in outline, with convex sides, a slightly convex base and asymmetrical side-notches that create a broad stem. A small barb is present on one side of the point but has broken off on the other side. It is similar to several types of side-notched point: Trimble (Winters 1967:25), Reed (Bell 1958:76-77) and Ellis (Bell 1960:32-33), which cover a temporal span from the Archaic to the Late Woodland period (see Plates 32 and 33).

13PK274

A somewhat wider assortment of lithic artifact types were found at this site than at 13PK23 or 13PK259. Along with moderate amounts of debitage, the assemblage includes scrapers, a drill, a punch or graver, a groundstone tool that was probably a grinding stone, pieces of two broken abraders, one blade flake and the mid-section of a projectile point.

One of the abrader fragments was found at 20 cm below surface in an excavation unit. Another broken piece which was recovered from surface about 16 meters away from the excavation unit was found to fit together with the subsurface piece to form a whole tool. This abrader was made from a rectangular slab of sandstone and has a wide, U-shaped groove deeply worn into one face. The other broken abrader, found on surface, has a narrow V-shaped groove across one face and several less distinct grooves on its sides and the opposite face.

Many of the other tools found at 13PK274 are broken or not finely finished. The recovered scrapers and cutting tools are of various sizes and shapes, many of them made from large, irregular flakes. Only a small percentage of the assemblage consists of utilized or retouched flakes. The one projectile point in the assemblage, found on surface, is missing both its tip and base. It apparently was triangular and corner-notched, with moderately pronounced barbs and slight serration on one edge. Here again, vandalism may have biased the sample of lithic artifacts available for study (see Plate 32).

13PK276

The ratio of tools to debitage is lower for the assemblage from this site than any other site. Of the eighteen artifacts that can be identified as tools, three are whole or partial projectile points, two are tips of large points or knives, and one is the tip of a punch or graver. Seven others are crude blade flakes, and one is a spokeshave fashioned from a thick, arc-shaped flake.

One small, side-notched point was found during surface reconnaissance. It has slightly convex sides and shallow notches that create an expanding stem

not quite as wide as the shoulders of the point. Notching is asymmetrical and the base is straight. Fragments of two other points were also found on surface at 13PK276; one is a large convex point base with broad side notches, and the other is the base of a point with a contracting stem, rounded at the base, and a square shoulder on one side (see Plate 32).

13PK314

Only two of the twenty-one tools and points found at this site came from excavation units; the rest of the assemblage was found on surface or in the water just at the edge of the lake. The subsurface artifacts are a broken fragment of a tool and a corner-notched projectile point, found at 20 cm below surface. The point is triangular in form, with a slightly concave base about as wide as its shoulders and serrations along the sides.

Six other whole or broken points were found on surface. One is a shattered fragment that appears to have been similar in size and shape to the point found in subsurface context. Another is the midsection of a small equilateral point, and a third is the bottom portion of a small side-notched point with a concave base. Also found were a small ovate point (missing the top one-third) with broad corner notches that create an expanding stem; a smaller version of the subsurface point with a convex base and shallow, asymmetrical corner-notches; and a medium-sized point with a straight stem, convex base and serrated sides.

Other tools found on surface include a broken chert tool that appears to be the base of a hafted drill or punch and two beveled scrapers. A broken axe made of hematite was found in the waters just off the eastern edge of the site area. This artifact is 5.5 cm wide, with a ground cutting edge that shows use wear. The base of the tool is missing, but part of a shallow hafting groove is present on one edge. The other edge is flattened, and the dorsal and ventral sides of the tool show no trace of grooving (see Plate 34).

13PK315

The most striking feature about the lithic assemblage from 13PK315 is the number of finished tools found on the surface of the site area. In total, twenty-four scrapers and eleven projectile points were recovered; only one scraper and one point were found in subsurface context.

The scrapers come in a variety of sizes and shapes. A number are ovate with steeply beveled edges; others are subrectangular or leaf-shaped with pressure flaking along one side. Most of these tools show definite wear patterns that reflect intensive use. One artifact found on surface is a side-notched projectile point that was refashioned to create a scraper suitable for hafting. The corners of the base and the tip of the point apparently broke in use, and the tool was refashioned into a scraper by modification of the broken edge.

The projectile points recovered from 13PK315 are of two forms: stemmed and corner-notched. Two of the stemmed points are subtriangular with straight to slightly contracting stems and slightly convex bases. These are both similar to the Fox River Valley Stemmed points of the late Archaic in

Wisconsin (Ritzenthaler 1967:21). Another is leaf-shaped with a narrow, straight-sided stem and rounded base. One shoulder of this point is much more definite than the other. The fourth stemmed point is a small variant of the Waubesa Contracting Stem (Ritzenthaler 1967:27) or Dickson (Montet-White 1968:64-65) forms, which date from the late Archaic to the Middle Woodland.

Of the corner-notched points, one is a large ovate, blunted at the tip. It appears to be a variant of the Snyder's point associated with Havana-Hopewell in Illinois. The remaining three points are various forms of triangular types with medium to broad corner notches, slight barbs and straight to slightly convex bases (see Plate 35).

CERAMIC DESCRIPTION

The ceramic assemblages from the seven sites excavated during this project are discussed in the following pages. For each site, a general description of the entire assemblage is provided, and diagnostic sherds or those with unusual elements are individually described (these sherds are identified by catalog number). The materials recovered by ISU and during the 1982 field season are included in these discussions.

It should be noted that many sherds from both surface and subsurface contexts are in poor condition as a result of intermittent saturation, and are limited in their analytical usefulness. Some standard descriptive traits are difficult to evaluate because of the physical alteration of ceramics during inundation. Color, for instance, may be changed or obscured by formation of precipitates on the surfaces of the sherds, or by leaching of certain components from the paste. Because ceramics are weakened by wet-dry cycling, it is not possible to determine the original hardness of the paste. Many sherds have worn or partially exfoliated surfaces, which makes it difficult to describe surface treatment, decoration and method of manufacture. Although these types of deterioration are present in sherds from every site, the overall condition of the sherds does vary from site to site. These variations may provide some clues about technological factors such as paste quality and firing temperature, since these appear to be crucial in determining the extent to which a given sherd will deteriorate during inundation.

Tentative type designations for diagnostic sherds are presented when possible, although most of the ceramics recovered during this project do not fit neatly into established taxa. Because there is no clearly defined ceramic sequence for the Central Des Moines River Valley, classification must be based on type descriptions generated in other parts of the Midwest. With this approach, however, one is tempted to "force" the sherds to fit particular type definitions. This may obscure the true nature of the cultural processes reflected by the ceramic assemblages from each site. All type designations herein, therefore, are based mainly on comparative morphology, and should not be taken to imply the presence of specific cultural traits associated with types defined in regions outside the project area.

13PK23

#36 (ISU catalog): rim sherd; 7 mm thick; fine crushed granite temper; exterior pale brown (10YR 6/3) to reddish yellow (7.5YR 7/8); moderately eroded; slightly rounded lip with exterior thickening and tool impressions to create "crimped" effect; rim slightly everted; slight constriction at juncture of neck and shoulder; sharp expansion at shoulder; surface cord-roughened and partially smoothed; parallel oblique single cord impressions on neck.

#37 (ISU catalog): rim sherd; 4 mm thick; fine crushed granite temper; exterior brown (7.5YR 5/6); slightly rounded lip with exterior thickening and notching; rim slightly everted; sharp expansion at shoulder; surface cord-roughened and smoothed over on neck.

#37A (ISU catalog): partial vessel with rim; 4 mm thick; fine crushed granite temper; exterior reddish yellow (7.5YR 3/2); surface cord-roughened;

flat lip with exterior thickening and notching; sharp expansion at shoulder; neck smoothed.

#93: neck sherd; coated with gray precipitate; at least 7 mm thick (interior eroded); crushed granite temper; medium-gage single cord impressions: 3 horizontal lines 4 mm apart with diagonal lines 6 mm apart above uppermost horizontal line.

#94: rim sherd; 4 mm thick; crushed granite temper; exterior yellowish red (5YR 5/8) to very dark gray (5YR 3/1); decorative motif same as #93, except for coarser cord with looser twist, cord impressions slightly closer together.

#95: rim sherd; 8 mm thick, thinning to 7 mm at rim; crushed granite temper; exterior light yellowish brown (10YR 6/4) to very dark gray (10YR 3/1); straight rim; flat lip, with 2 faint cord impressions on top of lip; vertical cord impressions from rim to neck, which is slightly constricted; row of bosses 7 mm in diameter, spaced 12 mm apart, 25 to 30 mm below lip; 2 horizontal incised lines between bosses (applied after bossing); trace of vertical incised lines below bosses.

#146: rim sherd; exterior surface badly eroded; crushed granite temper; trace of diagonal single cord impressions with horizontal cord impression just below lip; rounded lip with very slight roll.

#223: body sherd; 7 to 9 mm thick; surface roughened with fine cord impressions, very shallow and regular.

#224: body sherd; interior exfoliated, but at least 8 mm thick; surface roughened with cord impressions in diagonal weave; cordage similar to that used for #223.

Although many ceramic sherds were found at 13PK23 during the course of this project, most of them came from the surface of the alluvial fan remnant upon which the site is located. The surface material includes three partially reconstructed vessels which are part of ISU's collection. Only a few sherds, all from vessel bodies, were recovered during subsurface testing.

The ceramics from 13PK23 can be divided into two major categories. The first, and largest, group (A) is composed of numerous sherds characterized by thick walls, coarse grit and a severely degraded condition. The second group (B) includes thinner, more finely-made sherds, most of which are in fairly good condition. The relative degrees of degradation exhibited in these two groups appear to relate to differences in manufacturing technique and firing temperature. The Group A sherds probably were softer in their original condition than the Group B sherds, and were in all likelihood fired at a lower temperature. This made them more susceptible to exfoliation and weakening of the paste during inundation.

For sherds in Group A, colors are variable from yellow (10YR 7/6) to red (2.5YR 5/6), and interiors show some charring; temper is moderate to large fragments of crushed granite; thickness ranges from 6 to 10 mm on the least-eroded sherds; some exteriors show vertical cord-roughening, and some also have evidence of smoothing over the cord impressions. The few badly degraded rim sherds included in this group have flat lips and slightly flaring

shoulders. They appear to have been cord-roughened vertically, but no other decoration can be discerned.

The Group B sherds are pale brown (10YR 6/3) to dark reddish-brown (5YR 3/4) in color, with similarly colored interiors; temper is fine crushed granite or sand; vessel walls are 4 to 6 mm thick; exterior surfaces are cord-roughened vertically or diagonally to the lip. The rim and neck sherds are decorated with single-cord impressions in horizontal and/or diagonal bands, and lips are tool-impressed or incised on the outside. Rims are everted with slightly constricted necks, and shoulders are sharply defined. Vessel forms appear to be globular.

In general form, the Group A sherds appear to belong to some category of Middle Woodland ceramic ware, although the dearth of decorated sherds makes it impossible to classify them in a more definite manner. The single-cord-impressed decoration on the Group B sherds is a characteristic trait of Late Woodland ceramics. Although the sample is quite small, the decorative motifs on these sherds most closely resemble the type known as Minott's Cord-Impressed, especially in the use of coarse-gage cording for the application of decoration. The treatment of the lip in the Group B sherds does differ from the typical Minott's treatment, however, being more often a tool impression or incised notch rather than a cord impression. (A few sherds very similar to the Group B sherds from 13PK23 were found at Lake Red Rock in 1983. In Roper [1984:92-93], they are classified as some variant of Late Woodland cord-impressed wares, but no specific type name is assigned.)

Because most of the sherds in this assemblage were found on the surface of 13PK23, no exact stratigraphic relationships can be defined for the two groups. The few sherds which were found in test and excavation units, although very small, are most similar to the Group A sherds. If the site did contain multiple occupations, the Late Woodland component would have been the first to be affected by erosion, which would account for the lack of Group B sherds in subsurface context. No clear evidence of multiple occupation was encountered during excavation; however, the severely eroded condition of the site area in 1982 and 1983 precluded any detailed examination of subsurface stratigraphy (see Plate 37).

13PK259

The ceramic assemblage from 13PK259 consists of eleven small body sherds, nine of which were found in the main excavation block on the eastern edge of the site area. They range in color from light yellowish brown (10YR 6/4) to reddish brown (5YR 4/3), with very dark gray (2.5YR 3/0) to very dark grayish brown (10YR 3/2) interiors. Tempering material appears to be sand, with a high percentage of fine quartz grains visible in the paste. The average thickness is about 7 mm, although the range is from 6 to 9 mm. All of the sherds have cord-roughened exteriors. The cord that was used was rather fine - 0.5 to 1.5 mm thick - and the impressions are quite shallow, suggesting that surface treatment was applied to fairly dry clay. The cord impressions are parallel on some sherds and overlapping on others.

Because of the lack of decorated sherds, it is very difficult to draw any conclusions about the temporal position or cultural affiliation of this site on the basis of the ceramics. This assemblage falls within the parameters of

many different ceramic wares and exhibits no characteristics that are distinct enough to identify as belonging to one particular type category (see Plate 37).

13PK264

#217: rim sherd; exterior red (2.5YR 4/8), interior dark gray (7.5YR 4/0); 10 mm thick, thinning to 7 mm at rim; fine crushed granite temper; rounded, everted lip; 3 horizontal incised lines below lip (top line 5 mm below lip, others 2 mm apart); zoned decoration below horizontal lines: criss-cross incising (horizontal over vertical) on either side of incised inverted "V", filled with faint vertical cord impressions.

#218-259: rim sherd; exterior and interior yellowish red (5YR 5/6); 6 mm thick, thinning to 5 mm at rim; rounded, everted lip with slight exterior roll; cord-roughened in slightly oblique direction below lip.

Because this site lies below the normal water level at Saylorville Lake, it was not possible to do any subsurface testing here. The only ceramics found at 13PK264 were recovered from surface context, most of them during the 1982 field season. At that time, a large concentration of sherds and bone fragments was found in the water at the very southern edge of the low terrace which covers the site area. Both grit-tempered and shell-tempered sherds were found in the assemblage.

The majority of the assemblage (Group A) consists of body sherds tempered with fine crushed granite or sand. They average 7 mm in thickness, and their colors range from reddish brown (5YR 5/3) to light brown (7.5YR 6/4). About half of the sherds are coated on exterior and/or interior with a grayish precipitate. All of the sherds in this group have cord-roughened surfaces, but several different styles of surface treatment can be identified. A few sherds have very distinct impressions made with heavy-gage cord, and the roughening appears to have been done on fairly wet clay. Most of the remaining sherds in Group A have less distinct vertical cord impressions made with moderate-gage or fine cord.

Group B comprises about one-quarter of the total ceramic assemblage from 13PK264. These sherds are also tempered with crushed granite, but appear to have been roughened with a net or fabric woven from fine cord. They are slightly thinner than the other cord-roughened sherds, averaging 6 mm in thickness. One sand-tempered sherd does not resemble the rest of the assemblage: it is dark gray (2.5Y 4/0) and about 3.5 mm thick, with a smooth surface and fine, hard paste.

Group C consists of four shell-tempered sherds. These, also, are coated with a grayish precipitate, and are moderately eroded, especially on their edges. One of the sherds is a loop handle, about 2.5 cm in diameter. It is rather irregular in shape and not well finished. A portion of the vessel wall to which it was attached remains on one end of the handle. The other three items in this group are body sherds, all of which have smooth surfaces. Two sherds show decoration: one has very faint traces of three parallel trailed lines on one edge. The other shows what may be a portion of a trailed chevron: a straight line with part of another line running off the first at an oblique angle. Just above the trailing are the remnants of two possible lugs.

In each category defined above, more than one vessel appears to be represented. However, attempts at partial reconstruction of vessels were frustrated by the eroded condition of most of the sherds, which obscured the original configurations of the broken edges. The two grit-tempered rim sherds described above could not be definitely associated with any of the body sherds. At present, no type designations can be assigned to these rims.

The presence of shell-tempered sherds at this site obviously suggests an Oneota component. This is particularly intriguing in view of the present lack of evidence for Oneota occupation in the area upstream from Saylorville Dam. However, the exact nature of the Oneota presence at 13PK264 could not be discerned during fieldwork, nor could the sherds be classified as belonging to any particular subgroup of Oneota ware. The Oneota manifestation in the Central Des Moines River Valley has been termed the "Moingona" phase (Gradwohl 1974), so these sherds may be assigned - more or less by default - to that subdivision of the Oneota tradition.

13PK274

#78: small body sherd; exterior yellowish red (5YR 5/6); 7 mm thick; crushed granite temper; horizontal incised line with oblique incised lines above and short vertical incised lines below, over smooth surface.

#127-139: partial vessel body; exterior light red (2.5YR 6/8) to yellowish red (5YR 5/6); 9 mm thick; fine crushed granite temper; surface roughened with distinct vertical cord impressions.

#129-134: rim sherd; 9 mm thick; exterior yellowish brown (10YR 5/6) to yellowish red (5YR 5/8); interior slightly charred; crushed granite temper; row of bosses 5 mm in diameter, 10 mm below lip, spaced 2 cm apart (one is deliberate hole); lip flat, everted, beveled to exterior; surface roughened with vertical cord impressions.

#183: rim sherd; 9 mm thick, thinning to 7 mm at rim; dominant color dark gray (5YR 4/1); flat lip with very slight bevel to exterior; closely-spaced horizontal incised lines below lip; incising sloppily applied with pointed tool.

#221: shoulder sherd; very poor condition; dominant color very pale brown (10YR 8/4); trailed line 7 to 9 mm wide with slight curve, possibly over cord-roughened and smoothed surface.

#225: rim sherd; at least 11 mm thick (interior slightly eroded); crushed granite temper; dominant color brown (7.5YR 5/4); flat lip with slight exterior roll, beveled to exterior; row of bosses 5 mm in diameter, spaced 15 mm apart, 10 mm below lip; vertical cord-roughening under bosses.

#226: rim sherd; 5 mm thick; crushed granite temper; dominant color dark gray (10YR 4/1); lip slightly rounded with very slight bevel to interior and slight exterior roll; trace of very fine vertical incising just below lip.

#238: neck sherd; at least 6 mm thick (interior eroded); crushed granite temper; dominant color yellowish red (5YR 5/8); very fine parallel vertical incised lines 2.5 mm apart.

#284: small body sherd; 6 mm thick; crushed granite temper; exterior red (10R 5/8) but moderately worn; trace of fine incised parallel oblique lines above fine incised horizontal line.

#287: small body sherd; 5 to 7 mm thick; crushed granite temper; exterior red (2.5YR 5/6) but moderately worn; trace of fine vertical and horizontal incised lines over cord-roughening.

#399: small body sherd; 7 to 8 mm thick; crushed granite temper; exterior very dark gray (5YR 3/1) to dark reddish brown (5YR 3/2); very fine horizontal incised lines laid over very fine vertical cord impressions.

#401-408: partial vessel body; 8 to 9 mm thick; exterior yellow (10YR 7/6) to gray (10YR 5/1); interior slightly charred; coarse crushed granite temper; surface roughened with vertical cord impressions similar to #127-139.

#445: body sherd; 4 to 6 mm thick; crushed granite temper; exterior dark brown (7.5YR 3/2); fine incised lines over cord-roughening: 2 parallel horizontal lines 5 mm apart, and slightly oblique parallel lines 2.5 mm apart above uppermost horizontal line.

Most of the ceramic assemblage from 13PK274 came from subsurface context. Concentrations of sherds were found below 15 cm in several adjacent excavation units. Overall, the body sherds range in exterior color from brown (7.5YR 5/4) to yellowish red (5YR 5/6). Most of them are close to 9 mm thick, with coarse crushed granite temper that frequently shows through the vessel walls. All of the body sherds are roughened with rather heavy cord-impressions made with medium-gage cord. On sherds for which probable orientation can be identified, the cord roughening appears to have been applied in a consistent vertical pattern.

Just two modes of decoration - bossing and incising - occur in this assemblage, although both do not occur on any single sherd. The two bossed rims (#129-134 and #225) appear to be examples of Havana (Cedar) Cord-Marked, as defined by Logan (1976) and Benn & Thompson (1977). The incised sherds are, for the most part, very small, and their original orientation on the vessel(s) is unclear. Thus, exact decorative patterns cannot be identified. They possibly are related to the Early to Middle Woodland incised types (Black Sand and Spring Hollow) found in Eastern Iowa, which often occur in conjunction with Havana Ware in that locality. However, the only incised rim sherd from 13PK274, which was found on surface, does not show the interior decoration common to these types.

This assemblage is an example of the difficulty of applying extra-local ceramic typology to collections from the Central Des Moines River Valley. The sherds found at 13PK274 conform to types defined in eastern Iowa in some particulars, but also exhibit some aberrant characteristics. Rather than attempting to broaden the parameters of established types to include ceramics from regions outside their primary area of occurence, it may be more useful to define general patterns of ceramic style that can be related to particular temporal stages throughout the Midwest. Typology can then focus on the definition of local types within each style category. In the present case, even though this assemblage eludes exact definition, it seems reasonable to assign it a temporal classification of Middle Woodland, on the basis of similarities between the sherds found here and assemblages of that age from

adjacent regions (see Plate 37).

13PK276

No ceramics were found at this site during resurvey and testing. In 1983, about 100 small sherds and crumbs were recovered, all but two from subsurface context. None of these sherds show any traces of decoration, and most of them are in very poor condition. They range in color from red (2.5YR 4/6) to brown (7.5YR 5/4), but many are coated with a light gray precipitate. Temper is fine to medium-sized particles of crushed granite, and there appears to be a high ratio of temper to paste in most of the sherds. The average thickness of the sherds is 5 to 6 mm, but they range from a minimum of 4 mm to a maximum of 16 mm thick. Most of the sherds are too worn for surface treatment to be clearly seen, but some do show traces of parallel, fine-gage cord impressions.

This collection does contrast with the assemblage of body sherds from 13PK259: the sherd walls are slightly thinner, and different tempering material was used. At both sites, however, surface treatment consisted of fine-gage cord impressions, most of which were applied in a regular pattern. As is the case with 13PK259, the ceramic assemblage from 13PK276 is not distinctive enough to assign it a specific type designation (see Plate 37).

13PK314

#1142: rim sherd; 6 mm thick; crushed granite temper; exterior red (2.5YR 5/8); moderately eroded; horizontal incising; lip notched or tool-impressed.

#1144: rim sherd; at least 7 mm thick, thinning to 4 mm at lip (slightly worn on both surfaces); coarse crushed granite temper; exterior reddish yellow (7.5YR 6/6) to dark brown (7.5YR 4/2), interior dark gray (5YR 4/1); surface roughened with thick vertical cord impressions; three bosses, 3 mm in diameter, 11 mm below lip, spaced 7 mm apart (one is deliberate hole); two vertical lines of shallow round punctates with slight drag below bosses; straight rim, slightly rounded.

#1621: rim sherd; 8 to 9 mm thick; both surfaces eroded; trace of vertical cord-roughening; straight rim, rounded and slightly beveled to interior.

#2183: rim sherd; 6 mm thick, thinning to 4 mm at lip; exterior light yellowish brown (10YR 6/4), interior dark gray (7.5YR 4/0); crushed granite temper; surface roughened with fine vertical cord impressions; single boss, 4 mm in diameter, 5 mm below lip; straight rim, rounded with slight roll on exterior.

#2205: rim sherd; 5 mm thick, thinning to 3 mm at lip; exterior and interior dark grayish brown (10YR 4/2); crushed granite temper; surface roughened with vertical cord-impressions; single boss, 3 mm in diameter, 12 mm below lip; lip very slightly rounded.

#2350: rim sherd; 8 mm thick, thinning to 5 mm at lip; crushed granite

temper with high biotite content; exterior red (2.5YR 5/8), partially coated with gray precipitate, interior very dark gray (2.5YR 3/0); trace of vertical cord-impressions on surface; three bosses 2 mm in diameter, 5-6 mm below lip, spaced 7 and 10 mm apart; rounded rim, with roll to exterior.

#2376: base of vessel; exterior brownish yellow (10YR 6/6), interior very dark gray (7.5YR 3/0); 15 mm thick at point of base, walls 9 mm thick; crushed granite temper; surface roughened randomly with fine cord impressions; sub-conoidal form; point of base slightly off-center from curve of vessel walls.

#2527: rim sherd; 8 mm thick, thinning to 5 mm at lip; crushed granite temper; exterior reddish yellow (7.5YR 6/6), interior very dark gray (10YR 3/1); surface roughened with oblique cord impressions; four bosses, 4 mm in diameter, 12 mm below lip, spaced 7, 10 and 10 mm apart; two horizontal incised lines 10 and 15 mm below lip (applied after bosses); trace of criss-cross incising below horizontal lines; diagonal stick impression on interior of lip; interior surface shows shallow horizontal scratches; straight rim; lip slightly rounded.

Although the ceramic assemblage from 13PK314 is by far the largest in the sample, it is in particularly poor condition relative to the material from the other sites. Most of the surface material is bifacially exfoliated, and even the sherds found in excavation units are badly worn and rather friable. Over the entire assemblage, colors range from red to brown, with some interior charring. (This was particularly evident in the sherds from the hearth area.) Temper is crushed granite and appears to have been generously added to the paste. Body sherds range from 8 to 10 mm in thickness, with rims being somewhat thinner (4 to 5 mm). Many sherds still show traces of cord-roughening, applied in a random pattern over the entire vessel. Some appear to have been smoothed after the cord impressions were applied, although it is very difficult to separate intentional smoothing from the effects of erosion.

In terms of vessel morphology, the ceramic assemblage from this site closely resembles Havana Ware - or Cedar Ware, as it is known in Iowa (Benn & Thompson 1977): thick-walled (about 1 cm), coarse, friable paste and temper of crushed rock with many large, angular fragments. Rim forms are mostly straight to slightly flaring with barely discernible shoulders. Surface treatment appears to be over-all cord-roughening, applied vertically or at a very slight diagonal to the rim. The one vessel base found during excavation has a slightly rounded conoidal form.

The specifics of decoration among the rim sherds in the collection do not conform as closely to defined Havana/Cedar Ware varieties. The most common trait is a horizontal row of bosses, located 1.0 to 1.2 cm below the rim. These bosses are 2 to 4 mm in diameter, which is smaller than normal for Havana/Cedar bossed vessels. Most of these sherds also have slight to pronounced rolled rims, with rounded lips slightly beveled to the interior of the vessel. A few rim sherds show no decoration but vertical cord-roughening. One rim, which is otherwise similar to the rest, has two horizontal incised lines between bosses, 1.0 and 1.5 cm below the rim. The interior of the lip has been incised or stick-impressed. A zone of criss-cross incising can be discerned just below the horizontal lines, with a zone of what appears to be vertical cord-roughening adjacent to it.

The consistency of morphological and decorative characteristics among the sherds in this assemblage indicates that 13PK314 is a single-occupation site. Because of the similarity of the decorated sherds to Havana/Cedar Ware, a temporal classification of Middle to Late Middle Woodland seems reasonable. At this site, as at others discussed above, the ceramics do not fit neatly into defined ceramic type descriptions, even though they demonstrate a high degree of internal consistency (see Plate 38).

13PK315

#1094-1095: neck or shoulder sherd; 8 mm thick; exterior light brown (7.5YR 6/4); fine crushed granite temper; surface roughened with very coarse cord impressions in oblique direction; wide (2 mm) incised horizontal line, with oblique wide incised lines above; slant of incised lines is opposite to slant of cord-roughening.

#1292: small neck or shoulder sherd; 6 mm thick; moderately eroded; wide (2 to 3 mm) horizontal and diagonal incised lines.

This site yielded a relatively small collection of ceramics: only 15 sherds and crumbs. They range in color from yellowish red (5YR 5/6) to brown (10YR 5/3) on their exterior surfaces, and the interiors of most sherds appear charred. The tempering material is medium crushed granite particles, with a high percentage of translucent quartz crystals. Vessel walls average 7 mm in thickness, with a range from 4 mm to 9 mm. The exteriors of the sherds have been roughened with very distinct overlapping cord impressions. The cordage used for this was 2 to 4 mm in diameter, and the impressions are about 2 mm deep. It appears that the cord impressions were applied while the paste was still very plastic.

Although incised-over-cord-marked sherds were also found at 13PK314, the two assemblages differ in terms of both morphology and decorative detail. The body sherds from 13PK315 also differ from the assemblages recovered at two other sites that yielded very small ceramic collections. At those two sites (13PK259 and 13PK276), the cord-impressions on the vessel surfaces were done with fine-gage cord and are not particularly deep. At 13PK315, however, a much coarser cord was used to create a surface that is almost corrugated in texture. Although the sample is very small, the presence of incised sherds at this site suggests a temporal placement for 13PK315 in the Early Woodland to early Middle Woodland period, even though a specific type designation cannot be assigned to the ceramics (see Plate 38).

Analysis of Organic Materials

As mentioned in the methods section of this report, organic materials were collected during data recovery in several ways. Any bulk specimens found in excavation units that appeared large enough to be suitable for radiocarbon analysis were wrapped in sterile packing and retained. Soil samples for flotation were taken from various locations at each site; all features that were encountered were removed in their entirety, bagged and retained for flotation. Because organic material was rare at some sites, the collections for these sites were supplemented with charcoal and seed samples recovered during the intensive testing phase of this project in late 1982.

In the laboratory, all potential C-14 samples were given a preliminary cleaning and were then weighed. Only four samples appeared to contain sufficient carbon to be suitable for C-14 assay; these were sent to Beta Analytic, Inc. for processing, and the remaining specimens were retained for identification. Soil samples and feature matrix were floated through a series of geologic screens, using a convection flow apparatus designed to recover all materials greater than 0.125 millimeter in size. The recovered materials were then dried and hand-sorted. After non-organic matter and intrusive recent organic materials were removed, the remaining specimens were divided into four groups: charcoal, seeds, bone, and other materials.

Very little bone was recovered from excavation units and flotation samples, most of it in extremely small pieces that cannot be structurally identified. With the exception of the bovid teeth found at 13PK259, none of the bone was suitable for genus or species identification, although the dimensions of the pieces indicate that most of them are from birds, fish and small animals. The "other materials" group included fragments of what appear to be charred tree bark and nutshell. None of these pieces are large enough to permit identification without the use of a electron microscope.

Charcoal was analyzed using a binocular microscope with auxiliary lighting. Each specimen was examined at magnifications ranging from 15 to 30 power. Identification of specimen genus was accomplished by comparing the cellular structure of the specimen to microphotographs of representative samples of native woods. Genus distinctions were then made on the basis of size, arrangement and internal configuration of pores, tracheids, rays and other micro-anatomical structures. This technique requires that the specimen be of sufficient size to obtain a clear viewing plane, preferably a cross-section of interior structure. Some of the specimens obtained in the field were not large enough to permit identification in this manner. Specimens that were large enough to display distinctive characteristics were identified to the genus level. Species distinctions were not made because, for most deciduous trees, such distinctions are based upon subtle characteristics such as color, weight and hardness that are not observable in archaeological samples.

Seeds were analyzed in a manner similar to that applied to charcoal. Individual specimens were examined under a light microscope at magnifications ranging from 15 to 30 power. The structure of each seed coat and the interior configuration of the specimen, when observable, were compared to microphotographs and written descriptions of seeds from plants native to the

Midwestern United States. Genus identifications were made on the basis of similarities in shape, size and structural features. In some cases, but not all, it was possible to identify specimens to the species level.

The results of these analytical procedures are summarized in Figure 43. A summary chart of genera identified at each site is presented, followed by a more detailed list of sample locations and descriptions.

Among the charcoal specimens, the identified genera represent a number of types of trees common in the Des Moines River Valley at present, and indicate that these resources were readily available to the prehistoric occupants of the area. Oak and elm are most common; during the historic period, oaks and hickories have been found to be dominant in the uplands above the river valley, while elm species are found within the floodplain itself (Aikman & Gilly 1948:67-69). Maple and basswood presently form a major association in the upland areas. This association is a transitional community between the beech-maple association to the east and the basswood dominance in tributary valleys across the prairies to the west (Ibid.). Only one specimen was found that represents other common floodplain genera, either Salix (willow) or Populus (cottonwood/aspen). These woods, however, being relatively soft, are generally subject to rapid decomposition even when charred and are thus less likely than harder woods to be preserved in the archaeological record in the Midwest. The tentative identification of chestnut at two sites reflects the prehistoric presence of a genus no longer found anywhere along the Des Moines River (Ibid.), due to its virtual extinction by disease during the historic period (Panshin & De Zeeuw:560).

The identified seeds are from common weeds, all annuals with the exception of the perennial Canadian Milk Vetch. In all cases, the size of the seed was within the normal range for wild varieties. Thus, no evidence was found that any of these plants were being genetically manipulated by humans. Certainly, the mere presence of these seeds within the site areas cannot be taken as evidence that they were being gathered by the prehistoric occupants of the sites, since none of the seeds were found in quantities greater than those that would result from normal seed rain. The greater quantities of identifiable specimens from features probably resulted from the greater preservation potential that charring imparts to organic materials.

A considerable number of the seeds found in bulk and flotation samples were in very poor condition, with distorted seed coats and indistinct structural features. Much of this mechanical damage may be attributable to the wet-dry cycling undergone by these sites, combined with the action of frost heave in saturated soils. Ironically, the charring which helps to preserve organic material in temperate climates also appears to increase susceptibility to cracking and seed coat deterioration under conditions of periodic inundation (Lenihan et. al. 1976 Vol. II:5-17).

No genera were identified that are associated with a climate radically different from the present-day climate of the project area. All of the sites investigated date from the Late Archaic to the Late Woodland, after the end of the Hypsithermal climatic episode. During the time these sites were occupied, it is probable that biota within the valley were fairly stable, and were not affected by periodic fluctuations in precipitation and mean temperature to as great as extent as were plant communities in the uplands away from the valley. The generally mesic environment within tributary streams and the floodplain

Figure 43. Results of Analysis of Organic Materials

Charcoal

	13PK23	13PK259	13PK274	13PK276	13PK314	13PK315
Querus sp. (oak)	X		X	X	X	
Ulmus sp. (elm)			X		X	X
Acer sp. (maple)	X				X	
Tilia sp. (basswood)	X				X	?
Carya sp. (hickory)			X		X	
Castenea sp. (chestnut)	?				?	
Ostrya sp. (hophornbeam)	?					
Juglans sp. (walnut)					X	
Populus sp. (cottonwood/aspen)			?			
Salix sp. (willow)			?			

Seeds

	13PK23	13PK259	13PK274	13PK276	13PK314	13PK315
Amaranthus sp. (Pigweed)	X					
Ambrosia trifida (Giant Ragweed)	X					
Astragulus canadensis (Canadian Milk Vetch)	X					
Brassica kaber (Wild Mustard)	?					?
Chenopodium sp. (Goosefoot*)	X	X				
Ipomoea purpurea (Common Morning Glory)	X					
Polygonum sp. (Smartweed)	X	X			X	
Portulaca oleracea (Common Purslane)	X	X				

("?" indicates probable but not absolute identification.)

Figure 43, continued

Individual Sample Locations and Descriptions

13PK23		
bulk sample	U-1W (1982),10-15 cm	smartweed, nut case fragments.
"	U-1W (1982),20-25 cm	goosefoot.
"	U-1E (1982),15-20 cm	goosefoot, nut case fragments.
"	U-1B (1982), 5-10 cm	goosefoot, nut case fragments.
"	U-1B (1982),10-15 cm	goosefoot, nut case fragments.
"	U-1C (1982), 0-10 cm	smartweed, giant ragweed, canadian milk vetch, common morning glory, goosefoot, pigweed, possible wild mustard or vetch.
bulk sample	U-1C (1982), 10-15 cm	goosefoot.
"	U-4, (1982), 10-15 cm	giant ragweed, goosefoot.
"	U-5, (1982), 10-15 cm	smartweed.
"	U-6, (1982), 0-5 cm	smartweed, poss. pigweed, nut case fragments possibly walnut.
"	U-7, (1982), 5-10 cm	smartweed, goosefoot.
flotation	U-8, S 1/2, 20-25 cm	oak and maple; 2 others not identified, one possibly chestnut or hophornbeam; common purslane, goosefoot, possible wild mustard.
13PK259		
flotation	U-36, 35-36 cm (location of bovid tooth)	charcoal specimens not identifiable; goosefoot, smartweed, commong purslane, other charred seeds not identified: kidney-shaped, alveolate, honeycombed.
13PK274		
bulk sample	U-4 (1982), 20-25 cm	oak
"	U-9 (1982), 13 cm	hickory
"	U-9 (1982), 20 cm	hickory
"	U-9 (1982), 23 cm	hickory
"	U-11 (1982), 5-10 cm	cottonwood/aspen or willow
"	U-2, NW 1/4, 35-40 cm	elm
"	U-4, SW 1/4, 26 cm	elm
13PK276		
bulk sample	U-3 (1982), 20-25 cm	oak
"	U-2, SW 1/4, 30-35 cm	oak

Figure 43, continued

13PK314

(Note: samples marked with "F" came from inside the hearth feature.)

bulk sample	U-13 (1982), 30-35 cm	oak?
flotation	U-14 (1982), 30-35 cm	smartweed.
"	U-11, 22 cm	oak.
"	U-14, 27 cm	basswood.
"	U-14, 30-35 cm	smartweed.
"	U-15, 43 cm	too small for identification.
"	U-16, 43 cm	basswood.
"	U-17, 25-30 cm	maple.
"	U-17, 45-50 cm	chestnut?
"	U-28, 15-20 cm	oak.
"	U-33, 40-45 cm	oak.
"	U-36, 25-30 cm	basswood.
"	U-38, 33 cm	elm.
"	U-43, 35-40 cm	oak.
"	U-16, 45-50 cm, F	oak.
"	U-34, 15-20 cm	oak.
"	U-16, 45-53 cm, F	oak common; elm; maple or basswood.
flotation	U-16, 40-45 cm, F	oak; elm.
"	U-16, 53-55 cm, F	organic material too small for identification.
flotation	U-17, 40-45 cm, F	maple.
"	U-17, 45-50 cm, F	oak.
"	U-34, 35-40 cm, F	hickory.

13PK315

flotation	soil sampling pit, 16-30 cm, feature	all identifiable charcoal elm; possible wild mustard.

(Procedures and identifications taken from Cove, Cote & Day; Delorit; Montgomery; Panshin & Zeeuw; Radford; Renfrew; University of Illinois Agricultural Experiment Station)

would have continued to support most mesophytic species even as the prairie/woodland border fluctuated in the surrounding uplands. The evidence from this analysis thus is in agreement with the generalized environmental reconstruction presented in Benn & Bettis (1981) and summarized on p. 7 of this report.

III. CONCLUSION

RP3 STUDY UNITS

The Scope of Work for this project requires that the results of the data recovery program be interpreted in light of the objectives of the RP3 draft (as discussed in Section I) and the requirements of the Saylorville Lake Project Area MOA (presented in Appendix IV). Here, the site descriptions generated during fieldwork and lab analysis will be evaluated in terms of its applicability to the concerns of the RP3 draft.

The study units defined in the draft RP3 document which are potentially applicable to the Saylorville Lake locality are outlined on pp. 9-16. As presently interpreted, five of the sites examined during this project can be definitely associated with a particular study unit (see Figure 44). Two others can be given a classification of generalized Woodland but cannot be assigned to specific study units within that broad timeframe.

Unfortunately, none of the excavated sites could be identified as having definite pre-Woodland components. These study units are the least clearly defined at present, in large part because of the relative scarcity of identified *in situ* Paleo and Archaic occupations. As discussed previously, firm temporal identification of pre-ceramic occupations is still something of a problem in Midwestern archaeology.

It has been amply demonstrated in research over the years that prehistoric ceramic styles are much more flexible and change much more rapidly than lithic technology. This causes particular difficulties when dealing with the transition between the later part of the Archaic and the first appearance of ceramics. Shifts in lithic and ceramic styles were, in all probability, overlapping rather than synchronous, and the artificial boundary that archaeologists have defined at the point when ceramics came into common use does not necessarily require a corresponding change in existing lithic technologies. This situation is demonstrated at 13PK315, where incised-over-cord-marked ceramics and numerous Archaic-style points were found in context that suggested a single occupation. Other Saylorville sites that are presently defined as multi-component Archaic and Woodland may also be examples of this kind of technological discontinuity.

The RP3 study units that encompass the Woodland period are somewhat easier to relate to the results of the present project, since they are defined in terms of more specific settlement patterns and ceramic styles. The North-Central Woodland and the Southern Iowa Woodland study units, which are geographically peripheral to the project area, were not represented to any significant degree in the excavated sites. Late Woodland ceramics from 13PK23 could be considered related to ceramic styles found in southern Iowa, but only in so far as they share a decorative motif that appears to be common to much of the Midwest during the Late Woodland period.

In a similar manner, the Plains Woodland study unit is represented only

Figure 44. RP3 Classification of Excavated Sites

RP3 Study Unit	Sites Included in Unit
Pre-Clovis	none identified.
Paleo-Indian	none identified.
Early-Middle Archaic	none identified.
Late Archaic	possibility of Late Archaic/Early Woodland overlap at 13PK315 suggested by lithic types.
North-Central Woodland	none identified.
Plains Woodland	none identified; similarities in ceramic technology for Middle and Late subunits noted at 13PK23; similarities in lithic technology for Early subunit noted at 13PK315.
Southern Iowa Woodland	none identified: similarities in ceramic technology note at 13PK314.
Mississippi Basin Woodland	13PK23: multi-component Middle and Late Woodland subunits; 13PK274: Middle Woodland subunit (Havanoid association); 13PK314: Middle Woodland subunit (Havanoid association); 13PK315: Early and Middle Woodland subunits.
Great Oasis	none identified.
Moingona-Burlington	13PK264: Moingona phase sherds found in secondary deposition with Woodland vessel sherds; significance undetermined.

(13PK259 and 13PK276 can be identified as generalized Woodland, but cannot be classified as belonging to any particular study units within that timeframe.)

by the appearance of some typical Plains ceramic and lithic characteristics in the artifact assemblages from 13PK23 and 13PK315. Since the project area is located along a prairie-woodland interface, technology would be expected to reflect utilization of grassland as well as forest resources. However, evidence of the existence of horticultural villages that conform to the distinctive settlement pattern of the later Plains Woodland subunits is totally lacking at Saylorville Lake.

The final Woodland study unit - Mississippi Basin Woodland - is clearly represented in the excavated sites. Ceramics and lithics from four excavated sites demonstrate a relationship to major cultural manifestations of the Mississippi Valley and its tributaries. As noted previously, this study unit is not presently defined to include the Saylorville Lake Project Area, but is termed an "anticipated" manifestation in the Central Des Moines River Valley. As it is presently defined, sufficient evidence of the presence of this complex of cultural forms has been accumulated to justify modification of the spatial boundaries of this study unit to include Saylorville Lake.

It may be, however, that broadening this particular study unit to include the project area would result in the creation of a cultural category so generalized as to be of little interpretive utility. Ceramics from the excavated sites, when compared to recognized wares from throughout Iowa, can be classified as most similar to styles diagnostic of the Mississippi Basin Woodland, but not identical to them in all respects. Middle Woodland ceramics were found which conform in terms of vessel morphology to defined Mississippi Basin types, but not in terms of decorative treatment. Single-cord-impressed sherds from a Late Woodland component have an obvious relationship to types found to the east, but are morphologically more similar to Missouri Basin and Plains vessel forms. Dentate stamping, a very common decorative mode in eastern Iowa wares, is completely lacking in our sample. Thus, to define these ceramics as occurrences of types such as Spring Hollow, Havana or Madison would be to stretch the parameters of those types definitions quite a bit.

It may eventually prove more appropriate to split rather than lump: to define a new study unit that encompasses the Central Des Moines River Valley for the Woodland period. The technologies of the Saylorville Lake area vary from those of eastern Iowa and the Mississippi Basin sufficiently to warrant consideration as independent types. These, in turn, reflect differences in environmental characteristics and modes of resource utilization that should also be more fully taken into account. Creation of a new study unit would allow for more precise definition of these technological and environmental factors, eliminate overuse of the "most similar to" approach to classification, and thereby make it easier to clarify the nature of Woodland occupations in the Central Des Moines River Valley.

Two post-Woodland study units are relevant to the project area: Great Oasis, a Plains-related horticultural complex, and the Moingona-Burlington phase of the Oneota tradition. None of the excavated sites happen to include Great Oasis components, although previous researchers have identified such sites within the project area and further south along the river (Gradwohl 1974; Roper 1984). Only one of the sites examined during this project yielded evidence of an Oneota presence within the boundaries of the lake. Here again, Oneota occupation of the Des Moines River has already been established in other parts of the river valley (Benn 1984).

MOA RESEARCH TOPICS

The Memorandum of Agreement in effect for Saylorville Lake includes a set of research topics to be addressed by investigators working in the project area. These topics, generated during consultations between the Iowa State Historic Preservation Office and USAED-Rock Island, are shown in Figure 45. The relevance of the present project and its results to these concerns is discussed in the following pages.

The first MOA question relates to the interaction of two post-Woodland cultural manifestations known to be present in the Central Des Moines River Valley. The information about the distribution of Great Oasis and Oneota sites contained in this question, however, has been shown to be incorrect in the past few years. Roper (1984) has identified Great Oasis ceramics from the Red Rock Reservoir, which is south of the city of Des Moines; Benn (1984) has recently completed a study of an Oneota occupation in the Downstream Corridor of Saylorville Lake, north of the confluence of the Des Moines River with Raccoon Creek.

Even though the distribution of these cultural manifestations in and around the project area is now known to be different than once thought, the question of how they interacted is still a valid research concern. One site examined during this project - 13PK264 - yielded Oneota ceramics in deposition with grit-tempered Woodland sherds. The potential thus existed for identifying both Great Oasis and Oneota components at this site.

As previously discussed, this particular site appears to be located on an intermediate terrace which is presently below the normal water level at Saylorville Lake. No intensive examination of the site area was therefore possible. The only data recovered that might bear on this question were the shell-tempered and grit-tempered sherds found on surface in a shallowly-inundated portion of the site area. Four shell-tempered sherds were found: one a loop handle and two that showed traces of trailed decoration. The grit-tempered sherds included several rims of various designs and a large number of cord-impressed and fabric-impressed body sherds.

The assemblage of grit-tempered sherds was examined in light of the ceramic types characteristic of the Great Oasis manifestation (as defined in Anfinson 1978). The rim sherds did not conform to established types in terms of either decoration or form. The body sherds, although more difficult to conclusively assign to specific type categories, did not appear to have any particular similarities to body sherds found in Great Oasis sites. It was therefore concluded that this site, in all probability, did not contain a Great Oasis component, and can yield no information relevant to this research topic. (Since the third MOA research topic also relates to the nature of Great Oasis occupations in the project area, this conclusion effectively eliminates that topic from further consideration.)

The second research topic deals with the nature of Late Woodland occupations in the project area. One excavated site - 13PK23 - had an identifiable Late Woodland component. Most of the site area had been severely degraded by inundation and erosion before excavation began, and only a small portion of the cultural component was available for examination. Thus, this site does not provide a tremendous amount of information about Late Woodland occupations at Saylorville Lake. The data recovered during excavation do,

Figure 45. MOA Research Topics

1) Great Oasis sites in the Central Des Moines River Valley are distributed northward from the juncture of the Raccoon River with the Des Moines (the area presently occupied by the city of Des Moines) while Moingona Phase Oneota sites are apparently limited to the area south of that juncture. However, materials from several sites within the Saylorville project area (e.g., 13BN27, 13BN102, and 13BN114 among others) suggest the existence of a trade network between the two areas after A.D. 1000 (cf. Gradwohl 1974). The nature of this interaction needs to be elucidated.

2) The Late Woodland period in Iowa is generally poorly understood. The relationship of groups of this cultural affiliation in northeast Iowa and those in southeast Iowa, all of whom made cord-impressed and fabric-impressed ceramics, is not clear. However, by comparison, the understanding of the period is much more complete in these areas than it is for similar manifestations in eastern Iowa in general and in southwest Iowa. Information on Late Woodland manifestations in the central Des Moines River Valley, geographically intermediate to other portions of the state, would contribute to knowledge of the relationships of this cultural affiliation throughout the region between the Mississippi and Missouri Rivers. One might expect to find the cord-impressed and fabric-impressed ceramics of the central Des Moines Valley to be stylistically intermediate in major attributes and to show evidence of local stylistic variation as well.

3) Another related problem is the enigmatic relationship between Great Oasis as a cultural manifestation and the surrounding, perhaps contemporaneous, cultural manifestations referred to as Late Woodland in which cord-impressed and fabric-impressed ceramics are found. Great Oasis cultural traits are distinctive, and Great Oasis ceramics are relatively homogeneous when compared to ceramics from Late Woodland manifestations in the same region. Numerous sites in the project area (including 13BN27, 13BN38, and 13BN103 among others) are known to have both cultural groups represented and the interface between these groups needs to be interpreted.

4) The relationship between the Havana tradition of the Middle Woodland period as it has been identified in the Mississippi Valley and Havana-like manifestations found to the west in Iowa is unclear. Previous investigations in the Iowa River Valley and the Des Moines River Valleys have demonstrated the presence of Middle Woodland Havana-like ceramics, described as "Havanoid" to allow for local variation and interpretation. Within the Saylorville project area the best identified occurrence of Havana-like materials has been at the Boone Mound, 13BN29. The associated village, 13BN30, must be extensively investigated to determine the temporal and settlement pattern relationships between the two. Other sites in the project area at which Havana-like materials occur should be investigated in an attempt to identify the local interaction system. This information may then be compared in detail with reconstructions of the Middle Woodland interaction systems in other localities in Iowa and within the Mississippi valley.

5) Horticulture, as practiced by prehistoric groups during the Woodland and post-Woodland periods, is an elusive aspect of the study of early economic systems. Direct evidence of horticultural practices by Woodland societies is not widespread in the Saylorville project area, and such evidence which has been uncovered so far does not unequivocally demonstrate the local production of maize or other cultigens by Woodland peoples. More data must be gathered to clarify this aspect of prehistoric economic development.

6) Much research has been done in recent years regarding questions of the interaction of prehistoric cultures with the natural environment. Ecofacts such as snails, seeds, and other floristic elements, and other micro-faunal and macro-faunal remains have been recovered from several sites within the Saylorville project area; the intensive investigation of other sites within the area will undoubtedly contribute much more ecological information. Problems which can be addressed by environmental data from sites within the Saylorville area are numerous and varied. Geomorphological studies, in conjunction with paleobotanical and zoological studies, will contribute to deciphering the general ecological history of the landscape evolution on the Des Moines lobe. The paleobotanical and zoological data derived will help to reconstruct the biome in which prehistoric peoples lived and interacted.

however, include a few points of interest.

One feature was discovered at 13PK23: a pattern of postmolds forming one interior corner and part of an outward extension from one wall of a structure. The feature covered most of a "micro-terrace" that constituted virtually the entire remaining site area. The rest of this alluvial fan had already been severely damaged by erosion, so no additional portions of the feature could be uncovered. No evidence of a post trench or house pit was noted in the subsurface stratigraphy; however, the postmolds were only about 15 cm deep when encountered, and erosion may have already removed the upper strata which would have shown trench or pit outlines. The general house form evidenced by this feature appears to be one that is common to many Late Woodland and post-Woodland cultural manifestations in Iowa, even though exact size and the particulars of construction cannot be determined.

The data recovered from 13PK23 do not shed any light on the nature of the subsistence practices of its occupants. Flotation and bulk samples of organic material recovered during excavation yielded moderate amounts of charcoal, bone fragments and seeds, none of which exhibit characteristics of exotic or domestic cultigens. Even though the presence of a house structure implies a relatively high degree of sedentism, none of the artifacts found at the site indicate a connection to either of the two major horticultural groups - Great Oasis and Oneota - known to have inhabited the project area.

The Late Woodland ceramics from 13PK23 are predominantly decorated with single cord impressions in oblique and horizontal groups around the vessel rim. Because this decorative style is found in Late Woodland sites in many parts of Iowa and surrounding states, it does not imply a tie to any specific extra-local cultural manifestation. The vessel forms, as far as they can be reconstructed, are mostly globular, with high rims and sharply-defined shoulders. This, again, is a common Late Woodland trait, found from the Missouri Basin to the Mississippi River and its tributaries.

The nature of the ceramics found at 13PK23 has implications in two directions. First, their appearance serves as additional confirmation of the wide-spread and consistent appearance of a distinctive complex of ceramic traits during the Late Woodland period. However, differences in morphological and decorative details from region to region show a high degree of local variability. At Saylorville Lake, that variability takes the form of decorative motifs reminiscent of styles found in eastern Iowa and Illinois, imposed on what most closely resemble Missouri Basin or Plains vessel forms. A parallel situation appears in the Minnesota River Valley, another major drainage which forms a rough boundary between forest and grasslands. There, ceramics of the Cambria phase of the Middle Missouri tradition have been found to be conglomerates of specific traits associated with a diverse group of Plains and Woodland cultural manifestations: Mill Creek, Oneota and Great Oasis, among others (Shay 1966). At Saylorville Lake, the nature of the Late Woodland ceramics perhaps is a similar reflection of the project area's geographic location, in an intermediate position between the prairies and the eastern deciduous forests.

The fourth MOA research topic is the relationship between the Havana tradition which developed in the Mississippi Valley and Havanoid manifestations in eastern Iowa. Several sites examined during this project yielded artifacts that reflect, at the very least, some familiarity with the

technologies of Havana peoples. Ovate, corner-notched points, characteristic of Havana/Hopewell in Illinois, were found at both 13PK314 and 13PK315; ceramics from 13PK274 and 13PK314 appear to be variants of typical Havana wares.

The extent of the correspondence between Havana ceramics and examples found at Saylorville Lake is limited, however. The strongest resemblance lies in vessel form and surface treatment: thick-walled, coarsely-tempered, cord-roughened vessels with straight rims and subconoidal bases. Decoration shows considerable divergence from common Havana modes. No examples of dentate stamped ceramics were found at the excavated sites, even though this is very frequently found in Havanoid sites in eastern Iowa. The most common decoration in the ceramic assemblages from 13PK274 and 13PK314 is bossing, which occasionally appears in conjunction with incising, but is often the only decoration seen on a particular sherd. Osborn and Gradwohl (1981:637) noted a similar predominance of bossing and incising at Woodland sites they examined, as well as a less frequent occurrence of dentate and rocker stamping. These circumstances may reflect an adoption of some basic ceramic forms from the Havana tradition, with simultaneous retention of local decorative preferences.

The information recovered from the Middle Woodland sites examined during this project does not reveal much about the nature of the connection between Illinois Havana and the Des Moines River Valley. It serves primarily to demonstrate the presence of some form of interaction, which did not obliterate the distinctive local character of the Middle Woodland occupations in the project area. As additional Havanoid at Saylorville Lake are investigated, it may become possible to define the degree to which ceramic assemblages found at Saylorville relate to Havana ceramics and to each other, and to clarify the settlement and subsistence patterns of the period.

Topic #5 concerns the practice of horticulture during the Woodland and post-Woodland periods. No direct evidence of this practice was found at any of the excavated sites. Organic samples recovered from the sites have been found to include remains of native plants such as Amaranthus sp., Chenopodium sp. and Polygonum sp., but these remains do not exhibit morphological characteristics indicative of genetic manipulation, nor do they appear in unusually large quantity.

The final MOA research topic concerns environmental reconstruction as an aid to understanding prehistoric cultural patterns. It is, actually, more of an injunction that geomorphology, paleobotany, archaeozoology, etc. be applied during research at Saylorville Lake than a specific topic to be addressed during data recovery or interpretation. In the present project, the application of geomorphological principles proved to be a valuable aid to several phases of research.

The geomorphological character of the Saylorville Lake Project Area has been established in broad outline through the work of Benn and Bettis (1981) and Benn & Harris (1982) as well as during the project under discussion. Major landform types have been identified and described, and a general developmental chronology has been generated for those landforms. Intensive examination of landforms on a micro-basis has also provided data that aid in interpretation of the archaeological record as it presently exists in the project area.

While geomorphological investigations can generate many kinds of information, some care must be used in the application of that information to the analysis of archaeological data. Just as archaeologists may hold varying opinions about the nature and operation of cultural processes, geomorphologists do not necessarily hold monolithic views about the processes they study. Field data are open to interpretation by individual researchers, and the discipline of geomorphology has its own set of research questions that remain to be resolved. It is important, therefore, for archaeologists to be aware of the questions that cannot yet be answered. An example is the identification of precise dates for specific vegetational patterns or land formation episodes. Most geomorphic procedures do not focus on the identification of short-term (i.e. less than several hundred years) vegetational or topographic changes on a local level; to do so requires investments of time and resources that may be beyond the scope of most cultural resource research projects.

The use of geomorphology in an archaeological research project certainly does not absolve the archaeologist of responsibility for analyzing and interpreting field data independent of the conclusions of the geomorphologist. The most useful applications of geomorphology to cultural resource studies will be conducted in a cooperative fashion. For example, just as recognition of the potential for finding deeply-buried sites in some localities has been spurred by the work of geomorphologists, temporal classification of those sites by archaeologists has helped geomorphologists to refine their understanding of processes such as erosion, sedimentation and soil morphogenesis. By combining landform chronologies with cultural chronologies, more precise geomorphic models can be developed. This is especially useful in cases where the geomorphological data are in apparent conflict with the results of archaeological investigations. In this manner, both archaeology and geomorphology may benefit from the association.

Site Definition and the Problem of Temporal Placement

As Figure 4 shows, roughly one-third of all recorded sites at Saylorville Lake have not been temporally or culturally classified. The presence of so many "indeterminate" sites is by no means unique to Saylorville Lake; in fact, the archaeological record at Saylorville is actually somewhat better defined than it is at many other localities. At Coralville Lake, a Corps of Engineers' flood-control reservoir located on the Iowa River just north of Iowa City, 67% of the sites recorded as of May 1984 were unclassified as to time or culture (Emerson et. al. 1984:52). In the RP3 draft, Henning notes that a significant proportion of the recorded sites in a 22-county study area in south-central Iowa did not have cultural affiliation indicated in the state site files. The percentage of "general, non-ceramic" sites in these counties ranged from 25.9% to 75.4%, with a per-county average of 54.6% unclassified sites. Henning further notes that records at the Office of the State Archaeologist show that diagnostic materials were found at a number of these sites, but those who recorded the sites did not bother to include even tentative cultural affiliations on the original site forms (Henning 1982:127-130).

Thus, such undefined sites often represent a significant proportion of the archaeological record in a given area. However, they contribute very little, if anything, to the processes of comparative analysis and data synthesis that are the basis for advances in archaeological knowledge. Some of these sites undoubtedly contain information that would help to resolve the many serious gaps in our present understanding of prehistoric chronology, cultural patterning and technological variability in the Midwest. Because so much current archaeological research is done under the auspices of Federal CRM procedures, this situation is of particular concern to cultural resource managers who must make decisions about how such sites are to be treated.

There are several reasons for the chronic appearance of sites that cannot be or have not been placed in temporal perspective. To a large extent, the situation relates to current practices in archaeological field research and data analysis. We are faced with the fact that archaeology presently relies on two basic means of temporal definition: relative dating by means of diagnostic artifacts, or absolute dating techniques such as radiocarbon analysis of organic materials. Some sites simply do not contain either artifacts presently recognized as diagnostic of a particular time period or materials suitable for application of an absolute dating technique. At some of these, the lack of diagnostic artifacts and datable materials can be assigned to recent natural or human disturbances. Others, however, must represent short-term occupations that either reflect the activities of small groups of people - very early occupations, or nuclear families in a cyclical foraging system, for example - or specialized activities related to the maintenance of a larger settlement system. In either case, further study of these sites could help to clarify the nature of human/environmental interaction through time. No study of settlement patterns in a particular region could be considered complete if it did not take such small, special-purpose sites into account. They are, therefore, equally important to the full understanding of past human behavior as are larger sites.

Sites that cannot be dated by present means comprise a part of the whole set of indeterminate sites. The other part of the set includes sites that do contain sufficient archaeological evidence to determine temporal/cultural

affiliation, but that evidence has not been recovered or properly interpreted. It is these sites that will be discussed first.

Sites that could be temporally defined often wind up being included in the category "indeterminate" because of the manner in which initial site surveys are conducted. As they are known in Federal CRM terms, Phase I surveys are usually very limited in scope. They do not allow for much, if any, subsurface testing of surface artifact scatters. Thus, site definitions become dependent on the appearance of diagnostic artifacts in the surface scatter, the probability of which is reduced when working in areas subject to vandalism by unauthorized artifact collectors.

The minimal testing approach to reconnaissance-level survey therefore can obscure the true nature of some sites that would be easily classified if just a little more effort were expended during initial survey. Because its smallest unit of research is the individual artifact, this approach also often confuses matters by resulting in the identification of secondary artifact deposits as actual "sites"; e.g., locations of past human activity. This can become a significant problem when the sites under investigation are located in an area, such as a reservoir, where the potential for rapid site destruction is high and the accessibility of many sites for ongoing study is limited.

Reducing the frequency of occurrence of indeterminate sites in future research projects is, therefore, primarily a matter of carefully designing and executing initial site survey efforts. Expanding the definition of a Phase I survey to include a moderate amount of testing at the time the site is originally located should reduce the number of sites that would otherwise be classified indeterminate. Some sites will yield diagnostic artifacts or other datable materials, and others will prove to be secondary artifact deposits resulting from natural or human landscape alteration. Some sites will undoubtedly remain unclassified after Phase I work is completed, but these can be dealt with at a later point in the compliance process.

Dealing with sites that have already been recorded and are presently classified indeterminate is somewhat more difficult. At Saylorville Lake, some indeterminate sites have undoubtedly been destroyed by natural forces or recent human activities. The original status of some of these, as well as sites still extant, may be clarified by re-evaluation of the data recovered during initial site survey. The situation described by Henning, in which diagnostic artifacts were ignored when site forms were completed, was duplicated at Saylorville Lake in at least a few instances: ceramic sherds and diagnostic projectile points are included in lists of artifacts recovered from sites that were designated "indeterminate" by the researchers.

If opportunities to do so arise, at least a sample of the remaining indeterminate sites should be re-surveyed, with emphasis not only on recovery of diagnostic artifacts, but also collection of samples for radiocarbon dating. The development of the accelerator method, which accepts much smaller samples than could previously be tested, has expanded the potential for obtaining suitable samples from sites in the Midwest, where climate and micro-environmental factors make preservation of large amounts of datable materials relatively rare.

The other major type of indeterminate site is that which does not contain any materials currently recognized as datable. Many of these are termed

"lithic scatters"; they are, for the most part, small in both horizontal and vertical dimensions. At present, there is little that can be done to resolve the indeterminate status of such sites. This does not, however, mean that they should be ignored as potential sources of useful archaeological data. Such sites may represent early Holocene occupations or special-activity areas that relate to specific subsistence and technological systems. If such sites are not included in the development of cultural resource management plans, it is likely that their true significance to the archaeological record will never be fully understood. There are approaches that could lead to eventual clarification of the nature of these sites, by contributing to the development of new and more sophisticated approaches to temporal classification.

Making the assumption that the science of archaeology will develop new and better means of interpreting archaeological data in the future, it seems obvious that continuing, intensive study of small and disturbed sites must be considered an important part of any archaeological research project. It is only through such study that more sophisticated methods for dating sites are likely to be developed. Once a sufficient number of comprehensive artifact assemblages from datable and undatable sites is compiled, for instance, the comparative study of those assemblages may hold promise for identification of tool types, manufacturing techniques, material preferences, etc. that are reliable temporal markers.

A specialized example of the indeterminate site is the case of the "generalized Woodland" site. This categorization most often arises from the presence at a particular site of ceramic sherds that do not bear traits attributable to any specific Woodland cultural manifestation - body sherds, usually. Although it is preferable to no classification at all, the designation "Woodland" covers such a broad range of time and cultures that it is still of minimal use in site interpretation. Most ceramic chronologies for the Midwest tend to focus on decorative motifs and patterns as the most important diagnostic attributes, and give little attention to overall vessel morphology. Thus, a ceramic assemblage that contains only body sherds cannot usually be typologically defined. If characteristic patterns of manufacture, shape, size, temper composition and surface treatment within defined ceramic types were given more attention, it might become possible to assign fairly discrete cultural affiliations to sites that yield only body sherds. The use of thermoluminescence (TL) dating is another approach that would help in the development of reliable ceramic chronologies. This technique does require some advance planning in order to insure proper sample collection and treatment in the field, but is still within the grasp of virtually any survey or testing project.

Geomorphological analysis also has some potential for assisting archaeologists in determining probable occupation dates for sites not containing recognized diagnostic materials. While geomorphology is generally acknowledged to be a useful adjunct to archaeological studies, the primary application of such research has often been towards the location of deeply-buried sites. Any survey project can benefit from geomorphic research, however, since it also can help to identify disturbed strata and, thereby, secondary artifact deposits, and can also provide a general chronological framework for temporal ordering of sites. Although the complexities of soil morphogenesis make it very difficult to identify the age of particular strata within a timescale of several hundred years or less, it is usually possible to develop general models of Holocene landscape formation, from which earliest-

possible and latest-possible dates of occupation might be derived for specific landforms.

Because such possibilities for understanding "indeterminate" sites do exist, the study of such sites should not be viewed as a waste of time and resources. This is not to state that every indeterminate site should be excavated. Instead, a sampling procedure, based upon the present state of knowledge about the cultural chronology of a given area, can be used to select the sites that seem most likely to yield useful information to data recovery and analysis projects. At Saylorville Lake, for example, full-scale excavation of another Great Oasis village site may not add significantly to our understanding of the prehistory of the Central Des Moines River Valley. The application of an equal amount of effort to excavation of several small, undatable sites located on terraces or fan formations that remain intact may prove, in the long term, to be of greater utility to the development of a complete picture of that prehistory.

Cultural Resource Research in Reservoir Areas

The preceding discussion of "indeterminate" sites included some thoughts that relate to the much broader topic of how to design and execute site survey and testing projects in areas such as reservoirs, where natural forces and recent human activities have altered and continue to alter the archaeological data base. Reference has been made in this report to a variety of disruptive influences that have disturbed or destroyed sites at Saylorville Lake: inundation, sheet erosion, cutbank slumpage, incising drainageways, vandalism. These are very real problems at most, if not all, reservoirs. In the most drastic cases, they cause an irreversable loss of archaeological data. At the least, they can create very deceptive patterns of artifact and site distribution that make standard survey and testing methods less efficient than normal. Over the course of this project, it has become clear that there are certain assumptions and approaches that are more useful than others to archaeological research in reservoir areas. Applying this experience to cultural resource research plans for new reservoirs could help to avoid many of the problems that were encountered at Saylorville Lake.

Reservoirs are located in river valleys, which are, and apparently always have been, magnets for human occupation. They can generally be classified as high probability areas for site location. When planning research at a new reservoir, therefore, it should be assumed that the archaeological record in the project area will prove to be large and complex, containing a great number of sites which span a wide range of time and represent a variety of human behaviors. Given that fluvial landscapes are particularly susceptible to alteration by normal processes of erosion and deposition, exclusive of human intervention, it should also be assumed that the project area is likely to include a number of buried surfaces with similarly high site-location potential.

The evidence from Saylorville Lake as well as other reservoirs indicates that sites in reservoirs are often damaged or completely destroyed within a few seasons after impoundment. Thus, plans should be made to "front-load" archaeological research to as great an extent as possible. That is, survey strategies should include plans for moderate testing of sites at the time they are initially located, because many sites may be badly damaged or destroyed before it becomes possible to return to them for futher work.

Basic project objectives should therefore be, first, to maximize prompt data recovery (with emphasis on "prompt") and second, to avoid duplication of efforts by obtaining complete and accurate information during initial field endeavors. Assuming that there will be some limitations on the time available for research, a choice must be made. Is it preferable to compile a minimal amount of information on each of a very large number of sites in the project area, or to gather more detailed data from a smaller set of representative sites? The choice made at this stage of planning will set the pattern for the entire sequence of field research, data analysis and interpretation.

If survey coverage of 100% of the project area is the aim, it seems quite likely that the net result will be similar to the situation that presently exists at Saylorville Lake: a large number of recorded but mostly untested sites, many of which are no longer accessible for study, and a less than precise understanding of the nature of the data base. Our belief is that the use of an alternative approach, a carefully designed sampling strategy, would

reduce the amount of time spent on initial site survey, thus increasing the time available for more detailed study of individual sites, but would still provide a reliable and reasonably complete picture of the archaeological record in the project area. The procedures by which such a strategy could be implemented are explained in the following pages.

Preliminary work should include a thorough review of existing literature about the archaeology of the project area. What parts of the project area have already been surveyed, and what methods were used? Where have sites been found, and how extensively have they been investigated? Do existing site descriptions appear to be reliable and complete? The answers to these questions may show that some portions of the project area have already been thoroughly investigated, which will allow those portions to be eliminated from future surveys. It may also pinpoint particular time periods or cultural traditions that have already been well researched in the project area. These times or cultures could then be given low priority for further work, since they are already represented in the data base.

Geomorphic analysis of the project area should be started before any archaeological fieldwork is done. The focus of this preliminary research should be on reconstruction of the Late Pleistocene and Holocene geomorphic history of the project area. It should identify major landform types and locations, and also indicate where gaps exist in the stratigraphic record, since they may reflect corresponding gaps in the archaeological record. Geomorphic fieldwork should definitely include testing for buried surfaces, and should provide data that will contribute to refinement of the preliminary model of landscape formation. This will enable the archaeologist to identify specific locations where sites of certain ages could, or could not, be found. Another aspect of this research could be definition of present landscape conditions: what effect have post-settlement construction and agricultural activities had on the project area, what areas are badly eroded, where have sediments been actively accruing, etc. This information will help the archaeologist select survey methods appropriate to field conditions in different parts of the project area.

After this preliminary research has been completed, the process of actual field survey can begin. Assuming that a sampling approach is to be used, the first task is to define the proportion of the project area that is to be surveyed. Then, a method for selecting individual sample units can be formulated. Survey units could be selected as a stratified sample, with strata based upon the geomorphic model and background information on known site locations and previously surveyed areas. The sample strata should be three-dimensional; that is, they should include buried surfaces as discrete survey units. After the sampling strata are defined, one possible approach to sample unit selection would be the use of a "modified" random sample, with some survey units selected on a non-random basis. Areas that will definitely be destroyed or badly disturbed - borrow pits, structure locations, sewage lagoons, etc. - would be slated for survey early in the project, and used as sample units representative of their particular strata. (This does require that the archaeologist be kept informed of changes in construction plans.) The order in which sample units are surveyed would be developed on the basis of existing field conditions and the probability of imminent site disturbance in each part of the project area.

Since only a sample of the project area would be surveyed under this

approach, survey methods can be intensive and meticulous, employing close-interval subsurface testing, including deep testing, even in areas with little ground cover. When artifacts are found, additional testing should be done immediately to determine the nature and extent of the cultural deposit. With a limited amount of testing, it should be possible to define the approximate horizontal and vertical extent of most located sites, to evaluate their present condition and, in some cases, to identify probable cultural affiliation. In this way, the incidence of "indeterminate" sites can be reduced, and there will be a more solid basis for planning the next stages of research.

Once initial survey has been completed, the results can be compiled to create an overview of the archaeological record in the project area. This overview would indicate what time periods and cultural traditions are represented in the data base, as well as those that are not represented. Site locations could be plotted relative to the geomorphology of the area, which would give an indication of settlement patterns and preferences over time. (With a large enough data base, this information could also be used to generate a predictive statistical model of site location in the project area.) Plans for further research could then focus on filling in gaps in the data base through more intensive study of sites of particular ages, types and locations.

Construction and operating plans for the reservoir should also be taken into account when selecting sites for further work. Estimates of high water levels and frequencies can be used to identify the areas above pool level that will be hardest-hit by wave action and periodic inundation, and therefore the sites that will be soonest disrupted. If there is a good probability that there will be frequent drawdowns, sites that will be in the deep-water zone could be given a lower priority for immediate study than shoreline-zone sites, since the shoreline area will be subjected to more rapid rates of sheet erosion and cutbank slumpage. NPS studies have shown that deep-water sites are usually not too badly disturbed by continuous inundation, so data recovery at these sites could be deferred until a drawdown takes place.

The application of this type of cultural resource research strategy during the initial planning stages of a new reservoir project would address two important goals. First, it would serve the immediate purpose of providing a reliable body of data about the archaeological record in the project area, to be used in cultural resource management and research plans. The results of this type of project would also be relevant to archaeological research of a broader scope, by generating information applicable to the development of detailed cultural chronologies and a better understanding of the nature of prehistoric human behavior in the Midwest.

DIRECTIONS FOR FURTHER RESEARCH

As usually happens with research projects of defined scope, the results of this project seem to have raised more questions than they answered. A number of topics that appear appropriate for further inquiry at Saylorville Lake have already been mentioned in this report. Here, those topics are summarized, and a few additional ideas are put forth.

The geomorphological character of the Central Des Moines River Valley has been established in outline, but many details remain to be filled in. In addition to examination of specific landforms during testing and/or excavation, the following topics could be addressed:

- a buried erosional surface was identified at 13PK276. What is the exact nature of this surface? How old is it, and is it continuous in the adjacent fan formations? If so, why does it not appear in the alluvial fans further downstream (13PK315, 13PK314, etc.)? Does it have any potential for containing cultural deposits?
- the erosional episode during which these alluvial fans formed has been given broad temporal boundaries. Can more exact dates of formation be pinpointed? How do the cultural deposits found on the fans fit into this model?
- terrace remnants appear discontinuously in the northern portions of Saylorville Lake. Further examination of these landforms may help to refine the model of terrace formation generated by Benn and Bettis in the Downstream Corridor.

In the realm of cultural resource management, a number of topics stand out as being of particular significance at Saylorville Lake:

- some data recovered during this project suggest that commonly-applied lithic and ceramic chronologies are in need of revision. More artifact assemblages from controlled subsurface provenience are needed in order to formulate new artifact sequences and test their reliability.
- consideration should be given to the development of new ceramic type descriptions to encompass artifacts found during this and other projects in the Central Des Moines River Valley. These type designations should focus on the relationship between ceramics found at Saylorville Lake and established types of the Early, Middle and Late Woodland periods in other parts of Iowa and the Midwest.
- the RP3 draft should be revised in one of two directions: either to include the Central Des Moines River Valley in the Mississippi Basin Woodland study unit, or to define a new study unit for that locality with Early, Middle and Late Woodland subunits.
- future survey and testing projects should focus on examination of the full range of landforms in the project area, by application of a stratified sampling method. The data gathered can then be used to construct a settlement-pattern model that can be tested in future research.
- during the course of this project, it was discovered that elevation above lake level is not the sole factor influencing the extent and rate of erosional damage to cultural resources at Saylorville Lake. Sites that appear to be protected from disruption because they are located far above the normal pool level may actually be in danger of rapid degradation. Consideration should be given to testing such sites before they are too badly disturbed to yield much usable information.

IV. REFERENCES

Aikman, John M. and Charles L. Gilly
1948 "A Comparison of the Forest Floras along the Des Moines and Missouri Rivers." Proceedings of the Iowa Academy of Science 55:63-73.

Alex, Lynn M.
1980 Exploring Iowa's Past: A Guide to Prehistoric Archaeology. Iowa City:University of Iowa Press.

Anfinson, Scott, ed.
1979 A Handbook of Minnesota Prehistoric Ceramics. St. Paul:Minnesota Archaeological Society.

Anfinson, Scott F., Michael G. Michlovic and Julie Stein.
1978 The Lake Bronson Site (21KT1): A Multi-Component Prehistoric Site on the Prairie-Woodland Border in Northwest Minnesota. Occasional Publications in Minnesota Anthropology No. 3. St. Paul:Minnesota Archaeological Society.

Ashworth, Michael J. and Marshall McKusick
1964 Archaeological Resources of Saylorville Reservoir Drainage. Iowa City:University of Iowa.

Anderson, Adrian D.
1971 "Review of Iowa River Valley Archaeology". In Prehistoric Investigations, Marshall McKusick, ed. Report No. 3. Iowa City: Office of the State Archaeologist.

Bell, Robert E.
1958 Guide to the Identification of Certain American Indian Projectile Points. Special Bulletin No. 1. Norman:Oklahoma Anthropological Society.

1960 Guide to the Identification of Certain American Indian Projectile Points. Special Bulletin No. 2. Norman:Oklahoma Anthropological Society.

Benn, David W.
1978 "The Woodland Ceramic Sequence in the Culture History of Northeastern Iowa." Mid-Continental Journal of Archaeology. 3(2):215-283.

1979 "Some Trends and Traditions in Woodland Cultures of the Quad-State Region in the Upper Mississippi River Basin." The Wisconsin Archaeologist. 60(1):47-82.

Benn, David W. and E. A. Bettis III.
1981 Archaeological and Geomorphological Survey of the Downstream Corridor, Saylorville Lake, Iowa. Report submitted to the U.S. Army Corps of Engineers-Rock Island District. Decorah, Iowa:Luther College Archaeological Research Center

Benn, David W. and Suzanne Harris.
1982 Testing Nine Archaeological Sites in the Downstream Corridor, Saylorville Lake, Iowa. Report submitted to the U.S. Army Corps of Engineers-Rock Island District. Springfield:Southwest Missouri State University Center for Archaeological Research.

Benn, David W. and Dean Thompson
1977 "The Young Site, Linn County, Iowa and Some Comments on Woodland Ceramics." Journal of the Iowa Archaeological Society 24:1-61.

Bettis, E. A. III and David W. Benn
1984 "An Archaeological and Geomorphological Survey in the Central Des Moines River Valley, Iowa." Plains Anthropologist 29(105):211-227.

Bettis, E. A. III and Dean M. Thompson
1981 "Holocene Landscape Evolution in Western Iowa: Concepts, Methods, and Implications for Archaeology." In Current Directions in Mid-Western Archaeology: Selected Papers from the Mankato Conference. Scott Anfinson, editor. Occasional Publications in Minnesota Anthropology No. 9. St. Paul:Minnesota Archaeological Society.

Bonnichson, Rachel and David M. Hoch
1983 "Flake Dispersal Experiments: Noncultural Transformation of the Archaeological Record." American Antiquity 48(3): 553-572.

Brown, Lionel A.
1966 An Appraisal of the Archaeological Resources of the Saylorville Reservoir, Dallas, Boone and Polk Counties, Iowa. Smithsonian Institution River Basin Surveys, October 1966.

Cove, H.A., W.A. Cote and A.C. Day
1979 Wood Structure and Identification. Second Edition. Syracuse Wood Science Series No. 6. Syracuse, New York:Syracuse University Press.

Delorit, R.J.
1970 Illustrated Taxonomy Manual of Weed Seeds. River Falls, Wisconsin:Wisconsin State University Agronomy Publications.

Eidt, Robert C.
1973 "A Rapid Field Test for Archaeological Site Surveying." American Antiquity 38(2):206-210.

Emerson, P. M.
1983 Interim Report: Intensive Testing of Ten Archaeological Sites at Saylorville Lake. Report submitted to the U.S. Army Corps of Engineers-Rock Island District. Mankato, Minnesota:Impact Services, Inc.

Emerson, P. M., H. R. Finney, W. A. Watson and J. D. Irish.
1983 Resurvey and Intensive Testing of Archaeological Sites at Saylorville Lake, Polk and Dallas Counties, Iowa. Volumes I and II. Report submitted to the U.S. Army Corps of Engineers-Rock Island District. Mankato, Minnesota:Impact Services, Inc.

Esarey, Duane, K. Sampson and C. Suchy
1984 "The Carter Creek Site: A Weaver Phase Ring Midden in the Interior Uplands of West Central Illinois." The Wisconsin Archaeologist 65(2): 131-144.

Fritz, Gayle J.
1984 "Identification of Cultigen Amaranth and Chenopod from Rockshelter Sites in Northwest Arkansas." American Antiquity, Volume 49, Number 3 (July 1984) pp. 558-572.

Gradwohl, David
1967 "A Preliminary Precis of the Moingona Phase, An Oneota Manifestation in Central Iowa." Plains Anthropologist. 12:211.

1974 "Archaeology of the Central Des Moines River Valley: A Preliminary Summary." In Aspects of Upper Great Lakes Anthropology. Elden Johnson, editor. St. Paul:Minnesota Historical Society.

Gradwohl, David M. and Nancy M. Osborn
1973 A Roster of Reported Archaeological Sites in Saylorville Reservoir, Iowa. Report submitted to the U.S. Army Corps of Engineers-Rock Island District. Ames:Iowa State University Archaeological Laboratory.

1974 More Site Seeking in Saylorville: An Intensive Archaeological Site Survey of Reconnaissance Units 2 & 4, Saylorville Reservoir, Iowa. Report submitted to the U.S. Army Corps of Engineers-Rock Island District. Ames:Iowa State University Archaeological Laboratory.

1975a Still More Site Seeking in Saylorville: An Intensive Archaeological Site Survey of Reconnaissance Units 5 through 11 and 20, Saylorville Reservoir, Iowa. Report submitted to the U.S. Army Corps of Engineers-Rock Island District. Ames:Iowa State University Archaeological Laboratory.

1975b Contract Completion Report Stage I: Exploration of Archaeological Sites Endangered by Saylorville Reservoir, Iowa. Report submitted to the U.S. Army Corps of Engineers-Rock Island District. Ames:Iowa State University Archaeological Laboratory.

1976 Continued Site Seeking in Saylorville: An Intensive Archaeological Site Survey of Reconnaissance Units 12 through 19, Saylorville Reservoir, Iowa. Report submitted to the U.S. Army Corps of Engineers-Rock Island District. Ames:Iowa State University Archaeological Laboratory.

Henning, Elizabeth R.P.
1982 Implementation of the Resource Protection Planning Process in Iowa. Des Moines: Iowa State Historical Department, Division of Historic Preservation. (Draft).

Keeley, Lawrence H.
1980 Experimental Determination of Stone Tool Uses. Chicago: The University of Chicago Press.

Lenihan, Daniel J. et. al.
1981 Final Report of the National Reservoir Inundation Study. Volumes I and II. Santa Fe, New Mexico: Department of the Interior, National Park Service, Southwest Cultural Resources Center.

Logan, Wilfred D.
1976 Woodland Complexes in Northeastern Iowa. Publications in Archaeology 15. Washington, D.C.:U.S. Dept. of the Interior, National Park Service.

Losleben, Lynn M. and Richard A. Strachan
1979 Edgewear Analysis of Stone Tools. Unpublished Manuscript, Mankato State University Museum of Anthropology, Mankato, Minnesota.

Luchterhand, Kubet.
1970 Early Archaic Projectile Points and Hunting Patterns in the Lower Illinois Valley. Illinois Archaeological Survey Monograph No. 2, Illinois Valley Archaeological Program Research Papers, No. 3. Urbana:University of Illinois.

McCracken, R. J.
1960 Soil Survey of Polk County, Iowa. U.S. Government Printing Office.

Montet-White, Anta.
1968 The Lithic Industries of the Illinois Valley in the Early and Middle Woodland Period. Anthropological Papers No. 35, Museum of Anthropology. Ann Arbor:University of Michigan.

Montgomery, F.N.
1977 Seeds and Fruit Plants of Eastern Canada and the Northeastern United States. Toronto:University of Toronto Press.

Office of the State Archaeologist, Iowa
n.d. State Site Forms, Polk County, Iowa

Osborn, Nancy M. and David M. Gradwohl.
1981 Saylorville State 2 Contract Completion Report: Archaeological Investigations in the Saylorville Lake Project, Iowa. Report submitted to the U.S. Army Corps of Engineers-Rock Island District. Ames:Iowa State University Archaeological Laboratory.

1982 Saylorville Stage 3 Contract Completion Report: Testing of Priority 1 Archaeological Sites 1980-1981. Report submitted to the U.S. Army Corps of Engineers-Rock Island District. Ames:Iowa State University Archaeological Laboratory.

Panshin, A. J. and Carl de Zeeuw
1970 Textbook of Wood Technology, 3rd Edition. Volume I. New York:McGraw-Hill Book Company.

Perino, Gregory.
1968 Guide to the Identification of Certain American Indian Projectile Points. Special Bulletin No. 3. Norman:Oklahoma Anthropological Society.

1971 Guide to the Identification of Certain American Indian Projectile Points. Special Bulletin No. 4. Norman:Oklahoma Anthropological Society.

Prior, J.C.
1976 A Regional Guide to Iowa Landforms. Iowa Geologic Survey, Educational Series 3. Iowa City:Iowa Geologic Survey.

Radford, David S.
1984 Personal communication.

Renfrew, Jane M.
1973 Paleoethnobotany. New York:Columbia University Press.

Ritzenthaler, Robert.
1971 Wisconsin Indian Projectile Point Types. Popular Science Series II. Milwaukee:Milwaukee Public Museum.

Roper, D. et. al.
1984 A Cultural Resource Reconnaissance at Lake Red Rock, Iowa. Report submitted to the U.S. Army Corps of Engineers-Rock Island District. Jackson, Michigan:Commonwealth Associates, Inc.

Ruhe, R.V.
1969 Quaternary Landscapes in Iowa. Ames:Iowa State University Press.

1975 Geomorphology. New York:Houghton-Mifflin Co.

Schumm, S.A.
1977 The Fluvial System. New York:John Wiley & Sons.

Shay, Ruthann Knudson.
1966 Cambria Village Ceramics. Master's Thesis, University of Minnesota.

Soil Survey Staff.
1951 Soil Survey Manual. USDA Agricultural Handbook No. 18.

1972 Soil Survey Laboratory Methods and Procedures for Collecting Soil Samples. USDA-Soil Conservation Service Investigations Report No. 1.

1975 Soil Taxonomy: A Basic System of Soil Classification for Making and Interpreting Soil Surveys. USDA-Soil Conservation Service Agricultural Handbook No. 436. Washington, D.C.: U.S. Government Printing Office.

1981 Soil Survey Manual-Revised. USDA-Soil Conservation Service.

Talmage, Valerie et.al.
1977 The Importance of Small, Surface and Disturbed Sites as Sources of Significant Archaeological Data. Cultural Resource Management Studies, Office of Archaeology and Historic Preservation, National Park Service. Washington: U.S. Department of the Interior.

Tiffany, Joseph A.
1977 "Artifacts from the Sharp's Site: A Stearns Creek Component in Southwestern Iowa." Journal of the Iowa Archaeological Society. 24:84-121.

1978 "Middle Woodland Pottery Typology from Southwest Iowa." Plains Anthropologist. 23(81):169-181.

1981 The Keyes Archaeological Collection: A Finder's Guide. Des Moines: Iowa State Historical Department.

1982 A Preliminary Report on the Arthur Site, East Okoboji Lakes, Iowa. Research Papers Series, Volume 7, Number 1. Iowa City:Office of the State Archaeologist.

University of Illinois Agricultural Experiment Station
1954 Weeds of the North Central States. North Central Regional Publication No. 36. Urbana, Illinois:University of Illinois Agricultural Experiment Station.

Winters, Howard D.
1967 An Archaeological Survey of the Wabash Valley in Illinois. Reports of Investigations No. 10. Springfield:Illinois State Museum.

Yarnell, Richard A.
1964 Aboriginal Relationships Between Culture & Plant Life in the Upper Great Lakes Region. Museum of Anthropology, Anthropological Papers No. 23. Ann Arbor:University of Michigan.

V. PLATES

Plate 1. Landscape at 13PK23, looking southeast. The site area is the fan remnant in the center of the photograph.

Plate 2. Landscape at 13PK23, looking south. The site area is in the left center of the photograph. Prior to the creation of Saylorville Lake, this site apparently extended into the drainageway beyond the fan remnant.

Plate 3. Excavation units at 13PK23 (after rainstorm), looking southeast. This excavation block covered almost all of the site area that had not been lost to erosion by 1983.

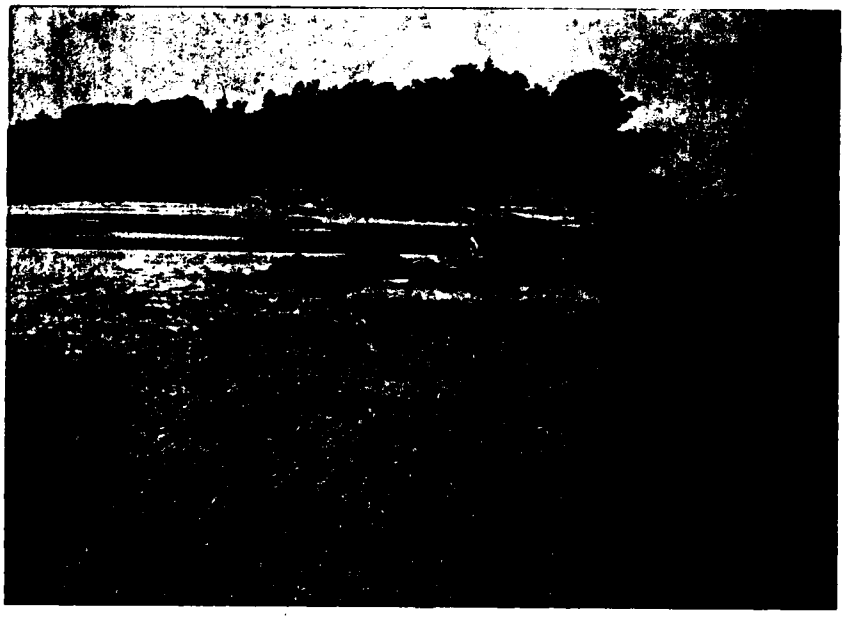

Plate 4. Landscape at 13PK259 from the southward riser of the terrace, northward over the tread of the terrace. The excavation where the soil was sampled and described is near the center of the site. The darker-colored, nearly horizontal streak at the base of the hillside is an old channel with wet soils.

Plate 5. Landscape at 13PK259 from east of the soil sampling site along transect 2, westward. This terrace extends westward for about 0.5 km before being interrupted by a drainageway from the uplands.

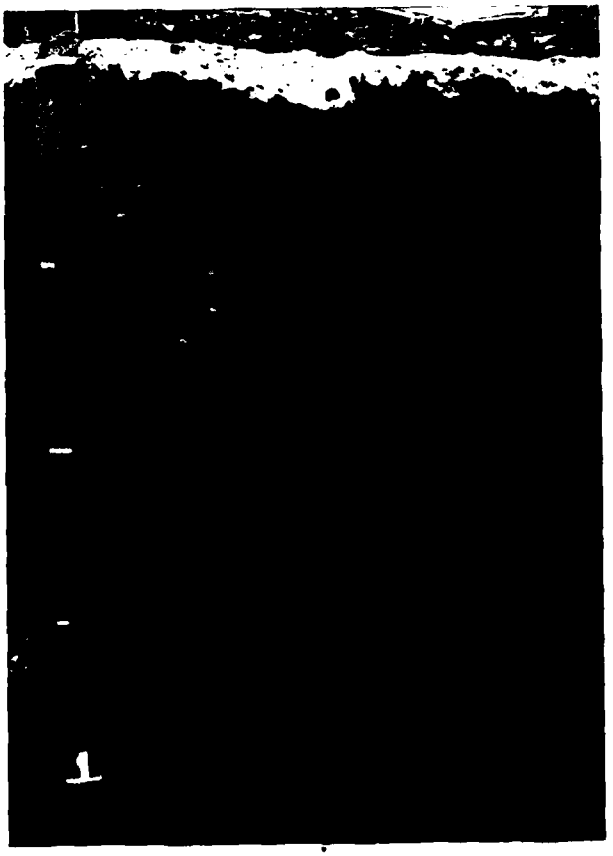

Plate 6. The soil sampled at 13PK259. The dark-colored upper layer terminates at about 70 cm (tick marks are at intervals of 25 cm).

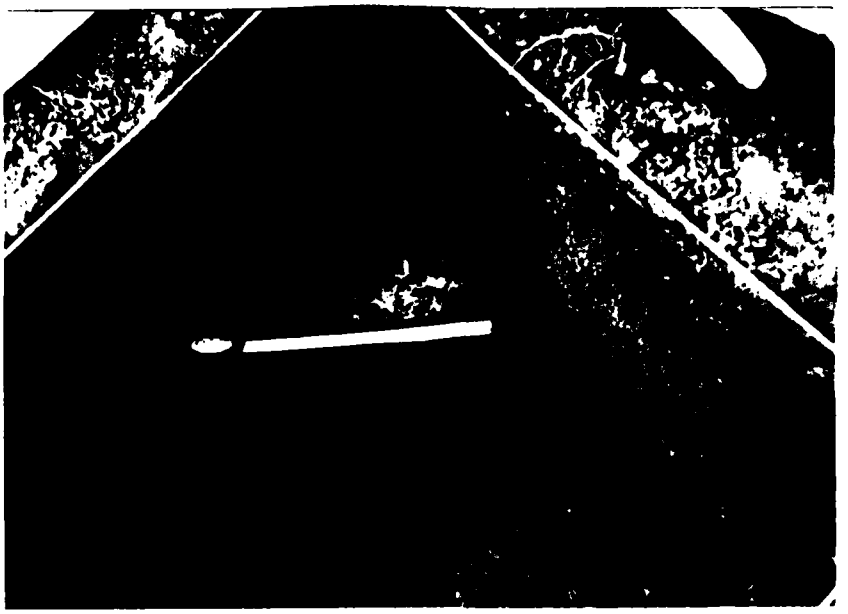

Plate 7. Chert knife found at 13PK259. The photograph shows the knife in situ in the southwestern corner of Unit 47 at approximately 32 cm.

Plate 8. Landscape at 13PK264 from the southward riser of the terrace across the tread, with the north-facing riser terminating in a low area of wet soils. The wet area is the dark-colored, nearly horizontal streak which begins at the top of the tools. 13PK259 begins beyond (northward) of the wet area. Transect 1 begins at the foot of the hillside in the center of the picture and extends southward across the soil sampling pit.

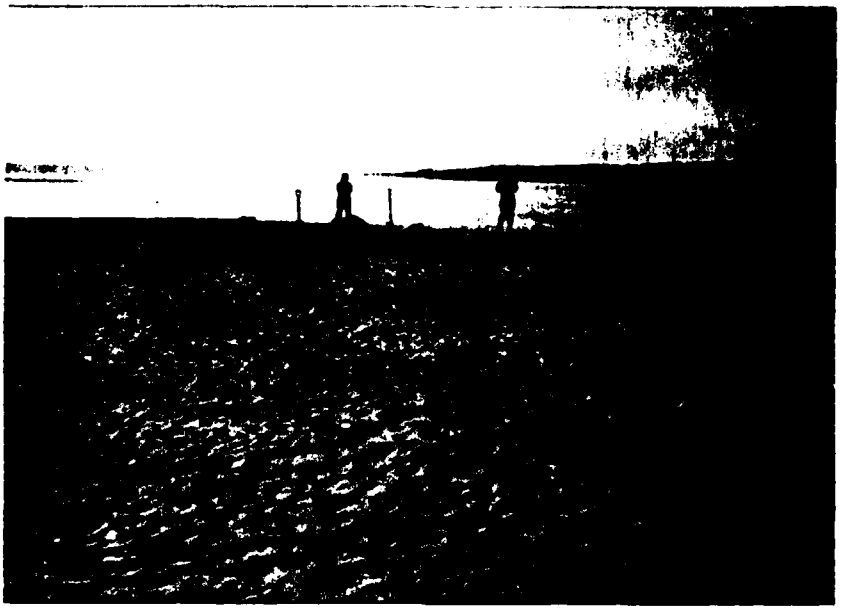

Plate 9. Landscape at 13PK264, looking southeastward across the site. The soil sampling site is the excavation in the middle part of the picture.

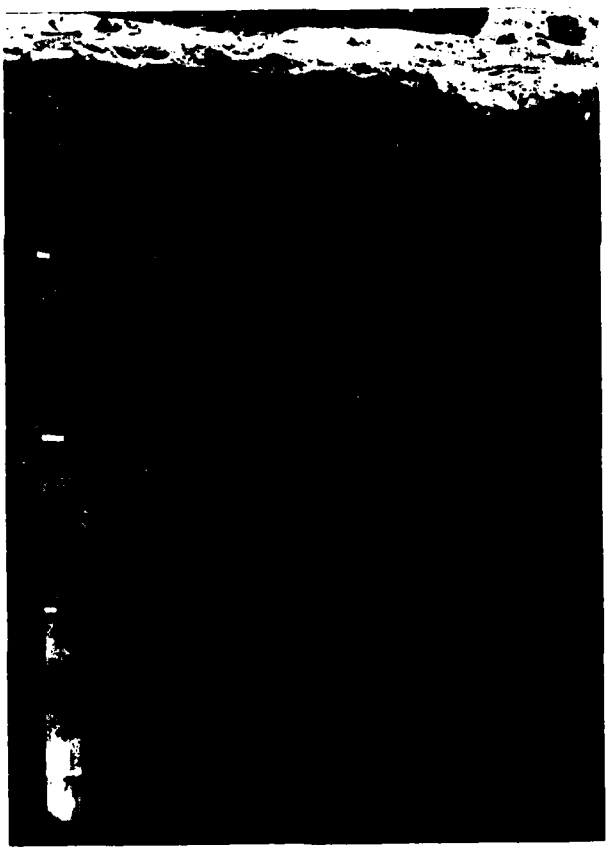

Plate 10. The soil sampled at 13PK264. The dark-colored surface layer, which is a plow layer, terminates at about 20 cm. The buried A horizon begins at about 90 cm. (Tick marks are at intervals of 25 cm.)

Plate 11. Looking down Transects 4 and 1 to the lake at 13PK274. The contact of the footslope of the hillside and the alluvial fan is at about the stump in the left center of the photograph. The excavation where soil was sampled is in the center of the photograph. The bar, landform component C10, is at the right center edge of the photograph.

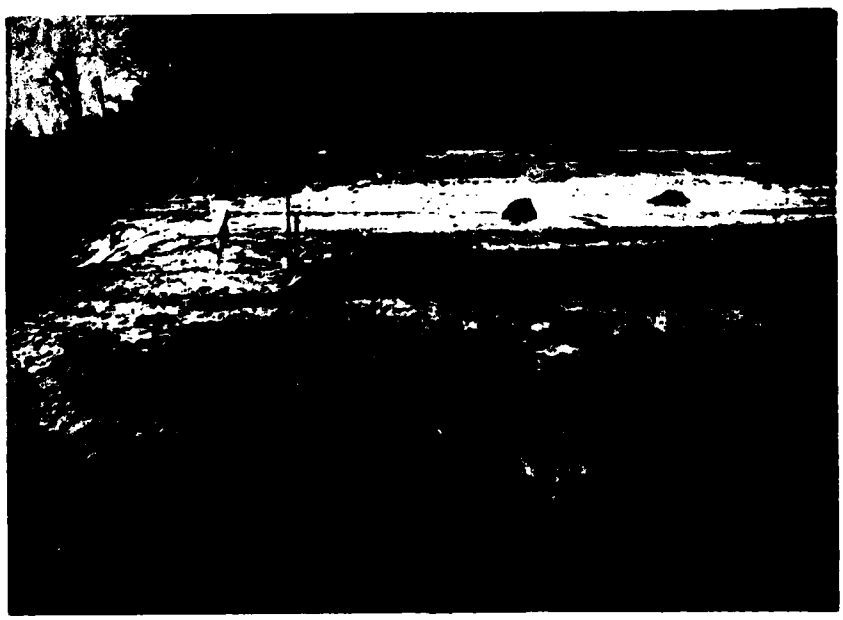

Plate 12. Looking up Transect 1 over the sampling site and onto the hillside, Transect 4, at 13PK274. A part of the lagoon, landform component C11, is at the left-center edge of the photograph.

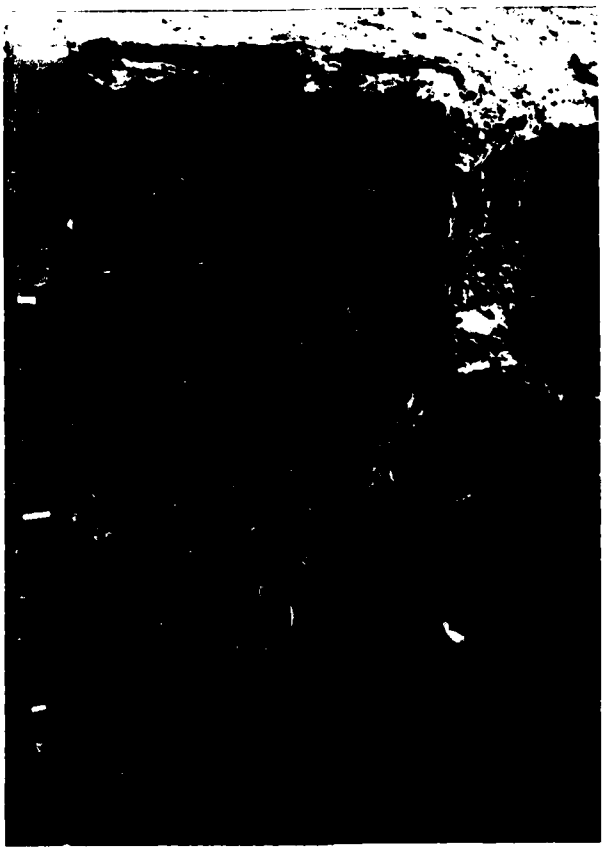

Plate 13. The well-drained soil sampled at 13PK274. The uppermost stratum (0 to 6 cm) is composed of stratified post-Saylorville Lake sediments. The A (6 to 20 cm), E (20 to 48 cm) and B horizons (48 cm to base of photo) shown here are typically of soils developed under forest vegetation. (Tick marks are at intervals of 25 cm.)

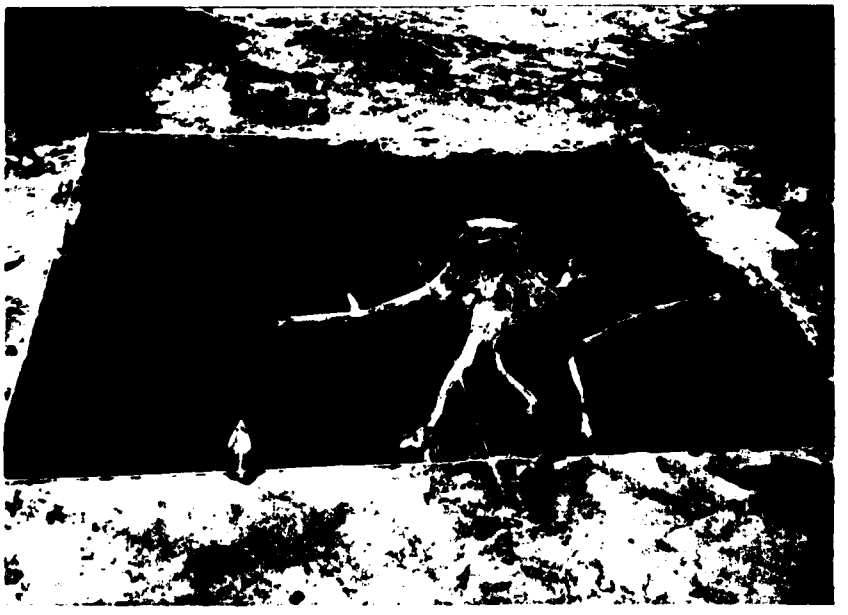

Plate 14. Excavation units #2 through #5 at 13PK274, looking north.

Plate 15. Looking down Transect 1 at 13PK276 from near the apex of the fan. The severely eroded bluff begins just beyond the workers. Soil samples for laboratory analysis were collected from the eroded bluff near the left edge of the photograph.

Plate 16. Sediments on the recently eroded lake-facing bluff at 13PK276. Three different sediments are visible here. The upper sediment which terminates at about 3.5 m, immediately above the boulder in center of the photograph, is Holocene alluvial fan sediments. A very gravelly and bouldery reddish-brown loam glacial sediment begins there and extends to about 4 m. Below that is inter-layered limestone, shale, and sandstone of the Pennsylvanian System which extends to the lake.

Plate 17. The well-drained soil sampled at 13PK276. The E horizon begins at the surface and extends to about 35 cm (tick marks are 25 cm apart). A transitional B/E horizon is at about 35 to 50 cm. The part of the B horizon with well-expressed subangular blocky and prismatic structure and distinct clay films begins at 50 cm and terminates at about 140 cm. There is no A horizon at the sampling site; it has been eroded off.

Plate 18. Excavation units #1 and #2 at 13PK276, looking northwest.

Plate 19. Looking down Transect 3 at 13PK314. The soil sampling site is in the middle part of the picture. Dark and light streaks, strandlines, result from erosion and deposition and are parallel to the lake surface. They, thus, approximate contour lines. Note that these streaks curve to right in the middle part and then to the left in the background. The lower-lying interfan area is where these streaks change direction. The higher part where the streaks turn to the left is the main part of another alluvial fan, the location of 13PK23.

Plate 20. Looking up Transect 3 from the soil sampling site at 13PK314. The contact of the alluvial fan and the footslope of the hillside is just beyond the worker.

Plate 21. Landscape at 13PK314, looking north-northeast. The site area is the fan remnant in the center of the photograph. The dark-colored area in the right center of the photograph is the filled-in drainageway that now connects 13PK314 to 13PK23.

Plate 22. A stepped, eroded part of the northeast-facing slope of landform component C9 at 13PK314. The bit of the space is at the B horizon. The pile of subangular blocky units to the right of the spade shows the well-expressed structure of this horizon. The micro-escarpment beginning at the spade handle and extending nearly horizontally to the right and left of it has its base at the contact of the E and B horizons.

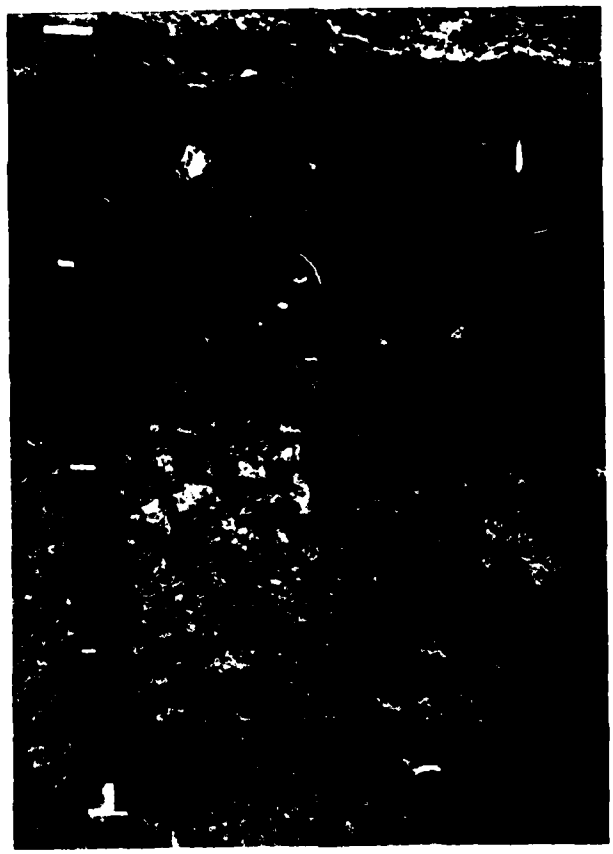

Plate 23. The moderately well-drained soil sampled at 13PK314. Stratified post-Saylorville Lake sediments comprise the upper 11 cm (tick marks are at 25 cm intervals). The dark-colored A horizon extends from there to 26 cm. The E horizon begins at 26 cm and terminates at 65 cm. The dark brown B horizon with mottles and translocated clay extends from there to the base of the photograph.

Plate 24. Ceramic sherds found on surface at 13PK314. These sherds were washed out of the stratum of redeposited sediments during a rainstorm, and were found in an area that had previously been surface collected.

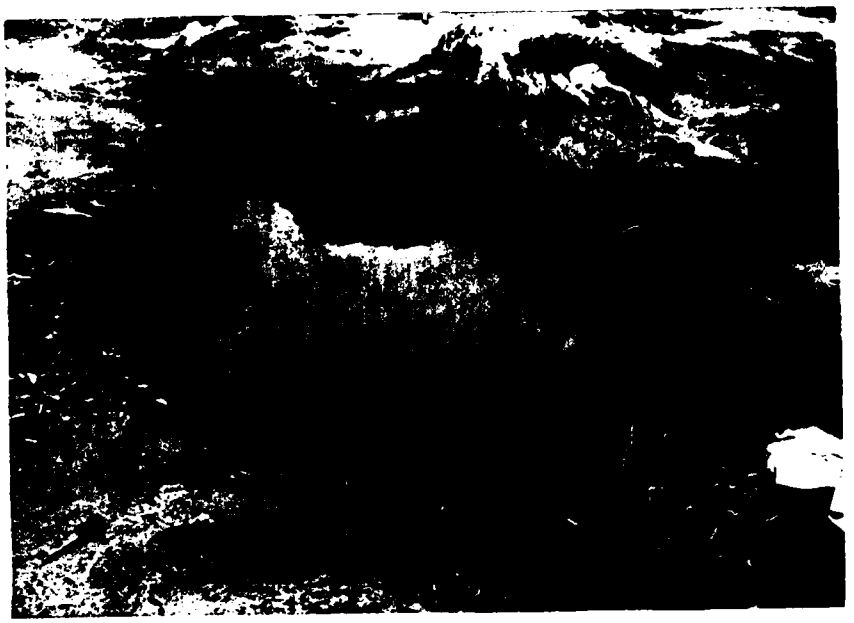

Plate 25. Excavation block at 13PK314 (after rainstorm), looking north. The hearth feature was located in the approximate center of the open area.

Plate 26. Looking from the footslope of the hillside, to the southern part of 13PK315 along Transect 4. The workers are near the contact of the fan and footslope. The soil sampled here for laboratory analysis was obtained from a pit later dug about 5 m to the left of the workers. (The feature which yielded a radiocarbon date of 2110 BP was found in this pit, starting at about 30 cm below surface.) The fan remnant across the inlet is the location of 13PK314. Note the distinct strandlines on that site, caused by receding floodwaters.

Plate 27. Strandlines at 13PK315 extending northwestward. The area of their concavity shows the lower lying area between of the higher part of the fan in the immediate foreground and the higher part of the next fan in the background.

Plate 28. The B horizon of the soil at 13PK315. A thin and discontinuous strata with subrounded and angular pebbles thought to be bed load sediments begins at about the center of the blade of the spade and extends horizontally to the right.

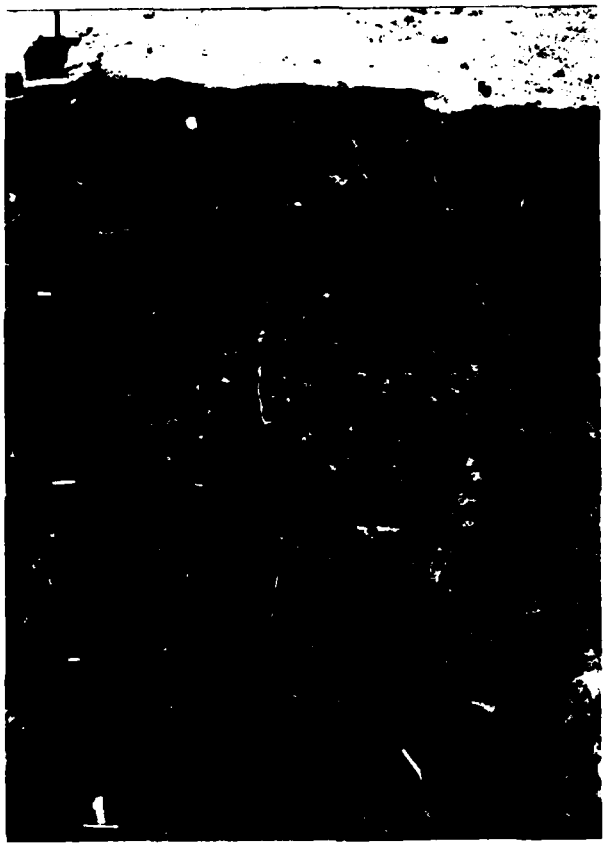

Plate 29. The well-drained soil sampled at 13PK315. The upper 1 cm is sandy post-Saylorville erosional sediments. The E horizon is at 1 to 50 cm. The B horizon begins at 50 cm and extends to the base of the photograph. The soil here has no A horizon; it has been eroded off.

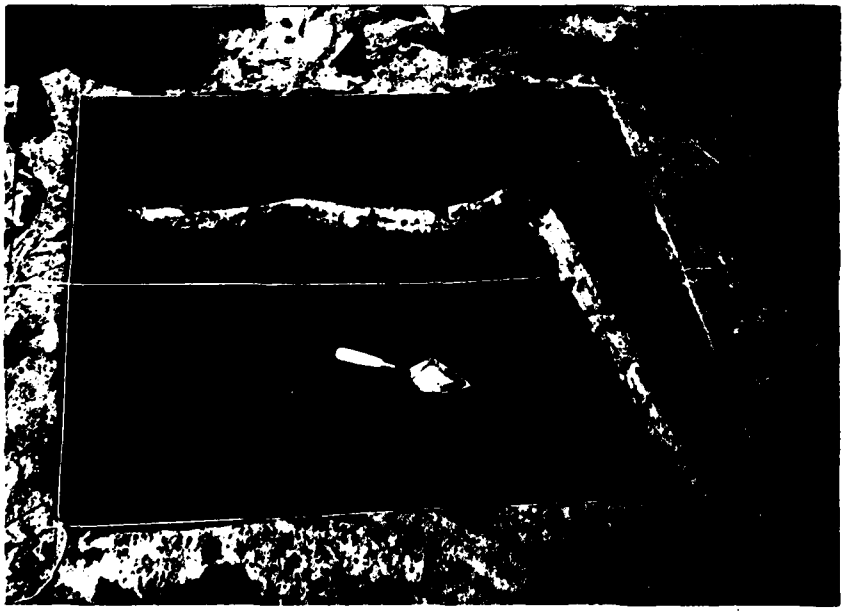

Plate 30. Excavation unit #2 at 13PK315. Trowel points north. Note the layer of fine white sand that covers the surface of the site area.

Plate 31. Projectile point found in unit #1 at 13PK315. This artifact is in secondary deposition, in a stratum of mixed sandy and loamy sediments deposited by floodwaters.

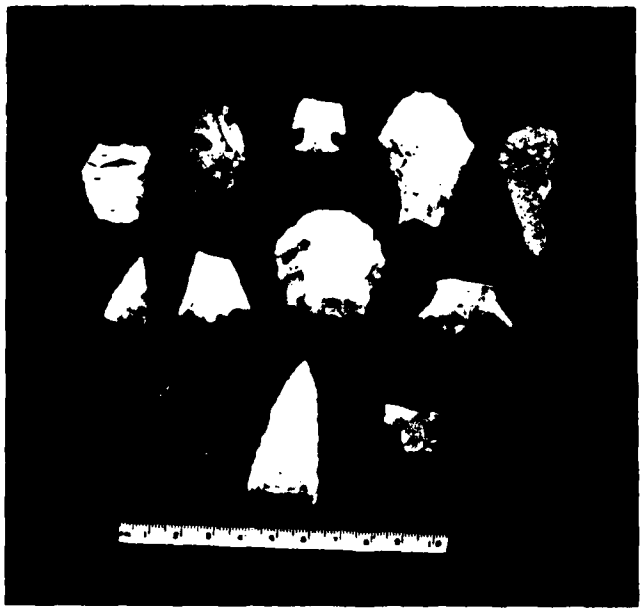

Plate 32. Lithic artifacts from 13PK23, 13PK259, 13PK274 and 13PK276.
top: 13PK23-213, 13PK23-221, 13PK259-1464, 13PK259-1143, 13PK259-727.
center: 13PK274-203, 13PK274-208, 13PK274-204, 13PK276-249.
bottom: 13PK276-501, 13PK276-1365, 13PK276-500.

Plate 33. Chert knives from 13PK259.
top: 13PK259-643, 13PK259-1293.
bottom: 13PK259-1400, 13PK259-1283.

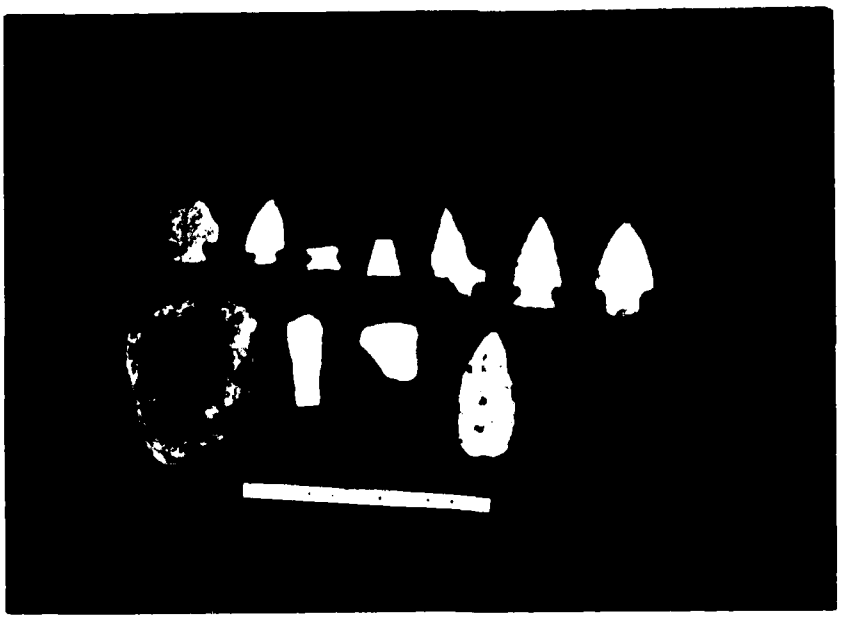

Plate 34. Lithic artifacts from 13PK314.
top: 13PK314-1792, 13PK314-1437, 13PK314-1435, 13PK314-1433, 13PK314-1436, 13PK314-2365, 13PK314-1466.
bottom: 13PK314-1169, 13PK314-1108, 13PK314-1791, 13PK314-1019, 13PK314-1731.

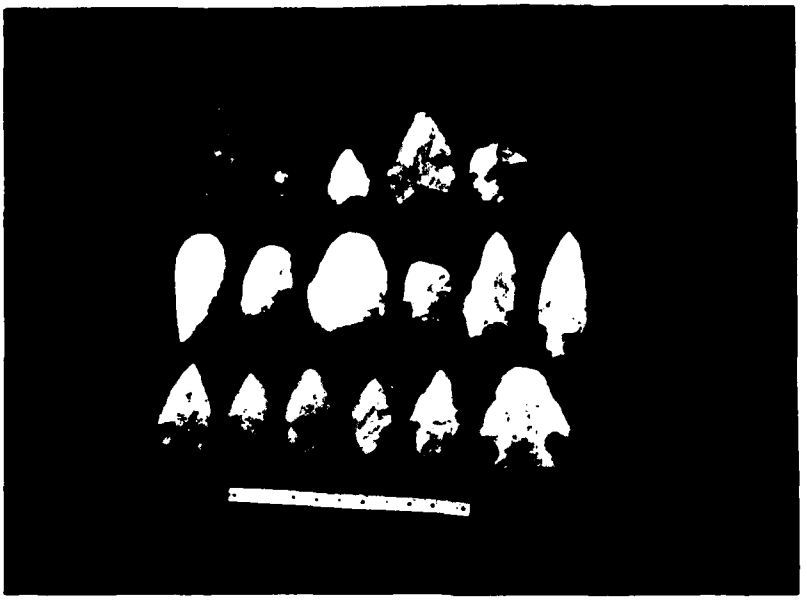

Plate 35. Lithic artifacts from 13PK315.
top: 13PK315-907, 13PK315-924, 13PK315-905, 13PK315-920, 13PK315-1087.
center: 13PK315-904, 13PK315-1088, 13PK315-918, 13PK315-1091, 13PK315-908, 13PK315-899.
bottom: 13PK315-1092, 13PK315-901, 13PK315-898, 13PK315-900, 13PK315-1090, 13PK315-902.

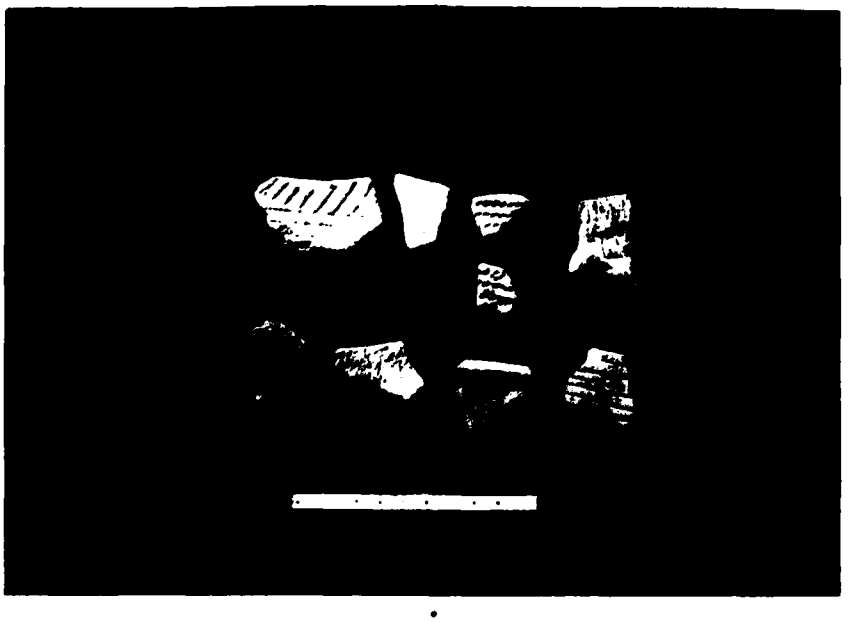

Plate 36. Ceramic artifacts from 13PK23, 13PK259, 13PK274 and 13PK276.
top: 13PK23-93, 13PK23-146, 13PK23-206 & 13PK23-94, 13PK23-95.
bottom: 13PK259-1443 through 1446, 13PK264-218/259, 13PK274-225, 13PK274-183.

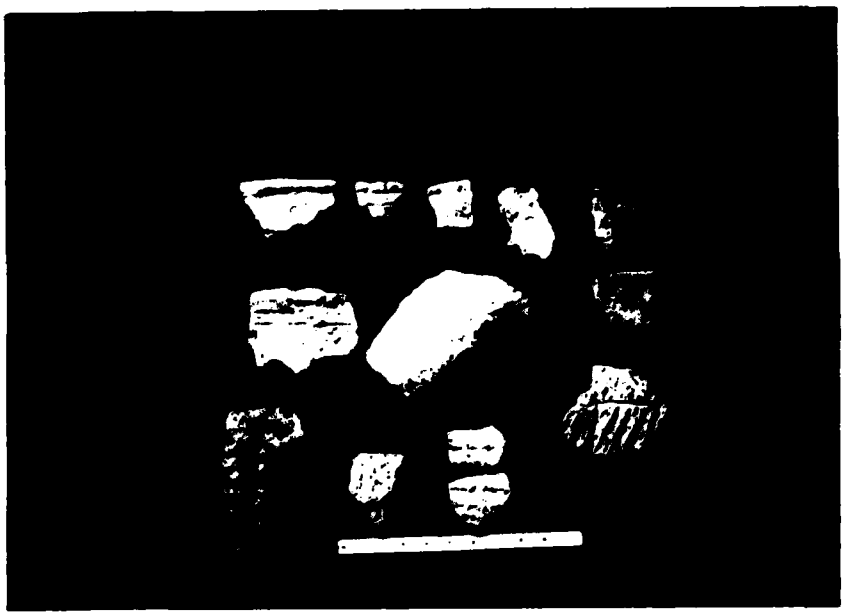

Plate 37. Ceramic artifacts from 13PK314 and 13PK315.
top: 13PK314-2350, 13PK314-1142, 13PK314-2183, 13PK314-1622, 13PK314-2205.
center: 13PK314-2527, 13PK314-2376, 13PK314-1620.
bottom: 13PK314-1144, 13PK315-1292, 13PK315-1304 & 13PK315-1303, 13PK315-1094/5.

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